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**An inquiry into role-play as a tool to deal with complex
socio-environmental issues and conflict**

by

Laura Colucci-Gray

**Thesis submitted to the Open University in fulfilment of the
requirements for the degree of Doctor of Philosophy**

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Abstract

This study explores how students understand and deal with a complex, socio-environmental controversial issue, which includes decision-making and conflict. The study consists of a sequence of empirical trials, in which children aged 13-14 engaged in a role-play simulation on intensive prawn farming in India. Two decision-making settings are proposed. First, students in role put forward their views in the context of a Court of Inquiry. Following this initial period of conflict, students are encouraged to practice active listening and empathy, to deal with the conflict.

Data were collected throughout the study to ascertain students' engagement and participation in the role-play. This included recordings of students' discussions, open-ended questionnaires, researchers' notes and students' own products, which were analysed by qualitative and quantitative means.

The results showed that the role-play often engaged the cognitive, social and emotional dimensions of students' learning, which were captured through the analysis of language. Competitive and argumentative approaches as well as cooperative and dialogical interactions were observed. Attention was drawn to the use of tentative and exploratory expressions in dialogue, which were generally respectful of other people's point of view and conveyed awareness of socio-ecological complexity, although more research needs to be carried out to facilitate students' engagement with perspective-taking and emotional awareness.

Drawing on the evidence of students' learning, this thesis argues that role-play can be used as a methodology for dealing with complex socio-environmental issues. The results illustrate a process of science learning which engages students' own knowledge, values and epistemologies, builds on participatory approaches and is more respectful of multiple perspectives and points of view. This raises questions about the image of science, the ethics of science and technology, the concept of the learner and the role of the teacher.

The limitations of the study are discussed, and suggestions for further research point towards the need for further explorations of the area of conflict and inter-subjective processes in pupils' learning. Initial suggestions for curriculum and assessment are given.

Foreword

My grateful thanks are due to the students who took part in the study and who gave me motivation and strength to continue this project; thanks also to the teachers who made their students' participation possible, and who supported me.

This thesis was an opportunity for me to learn more about a topic I was personally and professionally interested in. For this I am grateful to my main supervisor, Professor Joan Solomon and my former supervisor and colleague, Dr. Elena Camino, who gave me inspiration and sharpened my thinking. Thanks are due to the Open University's Centre for Science Education staff, research students and former Head of Department Jeff Thomas, for incredible support and fellowship, until the clumsy ideas developed and shaped into a thesis; to Richard Holliman and Elizabeth Whitelegg for acting as professional mentors. I am grateful to colleagues in Turin, Strathclyde and Aberdeen Universities, for welcoming me, providing support and an intellectually tolerant atmosphere, congenial to the continuous development of my work. Particular thanks to those who have engaged with my ideas and helped them develop, to Professor Christine Howe, Professor Donald Christie and to the many other educationalists, academics and researchers I had the pleasure to grow with.

I am finally grateful to my husband and colleague, Dr. Donald Gray for his constant loving attention, to my parents and friends in Italy and my daughter, Felicity. They are the ones who made it all happen, and contributed to making my academic search not more and not less than another adventure of life, which is offered here both for joy and for scrutiny.

Laura Colucci-Gray

Aberdeen

December 2006

1. Context and background

1.1 Introduction

As we progress through the first decade of the twenty-first century, these are stressful, worrying and yet important times for society. Risk is endemic in the way that contemporary societies conduct their technologically-intensive business (Beck, 1992). Global warming, waste disposal, energy production are examples of current issues confronting scientists and citizens at large. How do schools respond to the changes of the global era? How do we prepare ourselves to cope with the explosion of knowledge and the increasing sense of risk and uncertainty associated with environmental change? What are the values of science and technology?

This thesis reports an investigation of a methodological approach, which first interested me as a student of science, and then as a researcher in education. Starting from the dialogue developed within a research group in Italy, to the lively debates and developments which have characterised the field of science education in recent times, the background and context of this research included many influences of a personal and professional nature.

The main purpose of this chapter is framing the initial factors that brought me to the field of socio-environmental issues. The work of scholars in the field of environmental sustainability had shaped my understanding of current discourses around global and competitive economic growth. In another context, the work of philosophers and writers in the field of peace studies and global justice provided the knowledge basis and analytical tools for exploring civic action in relation to social and ecological inequalities. Preliminary investigations in these areas anticipated the theme of conflict and made me realise the complexity of this topic. A teaching and learning methodology, such as role-play, was thus adopted in this research as a means for exploring this potentially difficult area in the context of science education. The study is built upon an increased awareness of the power of language in shaping students' attitudes in social contexts, as well as their abilities to reflect on individual and collective behaviours. This knowledge is important for a reflection on science, and the learning processes which occur in the different settings of 'argumentation', 'discussion' and 'dialogue'.

The main aim of this work was therefore an exploration of a teaching and learning strategy that appeared suitable for supporting students' ethical understanding. The results were expected to further inform current thinking on the role of science education in the global context, and for reflecting on the implications for learning, teaching and research in schools.

1.2 Previous experiences with role-plays and the international dimension

My first encounter with role-plays on socio-environmental issues dates from some time ago, and is linked to my first contact with science education. I am not an educator by background. I started my academic career in science, gaining a first degree in Natural Sciences and was interested in biology. From those initial experiences however I gradually became increasingly preoccupied with the way we learn science and the quality of our understanding of the objects and processes of scientific inquiry. Like many of my fellow students, I had studied the natural world in detail. However, while I had gained confidence in the knowledge of concepts, I often felt disempowered towards important issues related to the environment and the natural sciences. I seemed not to have had sufficient opportunities to reflect on the knowledge I was assimilating. I had learnt something about scientific applications, but I would find it hard to reconnect my learning with everyday problems and debates.

At the time of completing my degree, I had the opportunity to participate in a role-play on a complex and controversial socio-environmental issue. This was part of a course organised by the Science Education Research Group at Turin University, which constituted the first opportunity to approach the field of science education. As I mention in Chapter 2, the research group had devised many role-plays dealing with socio-environmental controversial issues. Particularly important here was my participation and involvement in one of these role-plays, which exposed me to the analysis of a real, socio-environmental issue. More specifically, the topic of the role-play constituted the problems of water management and soil erosion in a small country in central Africa (Camino and Calcagno, 1991). In the role-play, characters from different nationalities, Western entrepreneurs and members of the local communities were convened to debate alternative ideas and courses of actions. Two main approaches to the ecological and economic problems of the country were thus proposed. One solution consisted of installing electric pumps to extract water from underground which could be used for

domestic and irrigation purposes. The other solution consisted of building dried walls – using local materials which had been traditionally deployed by rural populations to prevent soil erosion.

During the role-play I played the role of the journalist, which gave me the opportunity to listen to the discussion, ask questions and observe people in the debate. I became fascinated by the way in which the discussion of the problem revealed common misconceptions, even with students that had studied science at university level. An example was the difficulty for students of linking the water cycle with geological aspects, and to consider the different time-scales associated with different parts of the cycle. Quick processes, such as evaporation and transpiration needed to be considered alongside longer term processes, such as soil formation and aquifer replenishment. In addition, features of cognitive understanding were presented along with contrasting worldviews and models of development, held by the local and international groups (Colucci, 1998). The role-play was followed by a meta-reflection in which participants were invited to re-consider their choices and positions, to cast light on the values associated with knowledge, and the different priorities held by people involved in the controversy.

This reflective dimension of the role-play was particularly important to me. During the debate, students looked for scientific knowledge, but were confronted by contrasting sources, as well as missing information, and the exchange of different points of view made the complexity of the natural environment emerge. Observing how the participants dealt with the issue and the scientific aspects involved began to suggest that there was potential in the use of this methodology for approaching the study of science and the Natural systems with a fresh eye, which allowed for better awareness of the sophisticated relationships between techno-scientific developments and the environment. However, more research needed to be carried out on the relationship between values and knowledge in complex issues. Looking at knowledge *per se* was not sufficient; competences of a higher order, such as the ability to express oneself and present a point of view, to the disposition to reflect and think with others also appeared important, and it was a question of how all such abilities could be stimulated and developed.

1.3 Global issues and the quest for sustainability

The research conducted by the group, and my own work presented here, has been informed by the work of many authors in the international context. Particularly relevant to this work was the rationale supporting early curriculum development projects, such as Science, Technology and Society (Solomon, 1993), which proposed the use of role-play for the development of a scientific literacy. Those initial developments were subsequently re-considered by other authors, arguing for an expansion of the focus of science education. Hodson (2003) pointed towards the need for developing awareness of complex and global problems, and framing science education within a context of political action. In another context, Hicks (1995) had reclaimed the future as a missing dimension in education. While science mainly deals with the predicted, and often the feared future, an ability to formulate the desired future was envisaged as a priority. The ideas which are elaborated about the future influence the way people take actions in an everyday context and actions in the present influence the future to come. The dimension of the future, the global context and the emergence of environmental problems opened the scenario of science education towards new realms.

In this context, this research joins what is still a lively debate around the notion of scientific literacy and the implications for learning and teaching. On the one hand there is consensus about educating students and citizens to understand and deal with controversial issues. On the other hand, there is a quest for action and participation, in a global context, and how this may be achieved.

My previous experience with role-plays left me with a strong memory of the events and was the trigger for further investigations into other realms, which added to the growing awareness of the changing nature of science which characterise current debates on socio-environmental issues. Scholars in the area of law and environmental policy (more details in Chapter 7) for example have pointed to the tensions between scientific evidence and decision-making processes. When considering a scenario of increasing complexity and uncertainty, what is known by the scientists is as important as where scientific knowledge is produced and the interactions with other systems of knowledge.

As reported by Sarewitz (2004):

'the necessity of looking at nature through a variety of disciplinary lenses brings with it a variety of normative lenses. [...] Scientific uncertainty which so often occupies a central place in environmental controversies, can be understood not as a lack of scientific understanding, but as the lack of coherence amongst competing scientific understandings, amplified by the various political, cultural, institutional contexts within which science is carried out' (p.1).

In this scenario, a recent critique of decision-making processes on complex, socio-environmental issues made by Jasanoff (2003 and 2005) addressed the need to reconsider existing relations among decision-makers, experts and citizens. Pointing to the structural and cultural constraints on collective participation, the author anticipated the need for new ways of thinking – ethical concerns as well as learning processes – as keys for addressing global change and uncertainty (McMichael, 2001).

In this context, the reflections and experiences I had shared with the Italian research group acquired new significance. In a recent account of the work conducted so far in the field of socio-environmental issues, role-play was proposed as a methodology for enhancing a plurality of perspectives (Colucci *et al.*, 2006), an approach which was considered more appropriate for educating students and citizens to engage with the complexity of current global issues. In the same account, the problem of conflict however was also raised, signalling the fact that in conditions of complexity, plurality and uncertainty in decision-making regarding complex issues, conflict is bound to arise, and perhaps in more powerful ways than what is currently acknowledged and understood by science educators, experts and public alike. Could the role-play methodology then be used to educate students to understand and deal with the occurrence of *conflict* in everyday issues? What would be the nature of such learning and what may be the specific setting and learning dynamics involved?

In the following section I begin to outline some of the background experience which set me on the path of this investigation, starting from a particular issue – that of prawn farming, used in this work. In the section below I begin to outline its general features and how the study of a contemporary issue allowed for taking a closer look at the meaning of conscious and responsible action in a complex world.

1.4 The issue of prawn farming and the conflict

The topic of the role-play used in this work (described in more details in Chapter 3) confronted me with a number of interesting and problematic aspects, which challenged my own knowledge of the environment and my perceptions of science, and triggered my curiosity towards current political scenarios. The international context, the local and global dimensions and the emergence of conflict associated with people's actions constituted the three interconnected elements which accounted for the complexity of the issue.

During a conference organised to celebrate the 50th anniversary of Gandhi's death held in Turin in 1998, an Indian lawyer reported the social and ecological impacts of intensive prawn farming installations along the coasts of tropical countries. This particular issue struck me because of the global dimension of the conflict, and the ethical and political issues that emerge. Prawns are traded around the world; the act of consuming prawns make people become active agents in a complex web of interactions, involving multiple human communities and the natural environments. In contrast to previous controversies examined by the group, such interconnections are difficult to conceptualise as simple relationships of cause and effect. Actions are taken by people in different local environments, and this can have both global effects and localised impacts. People may not be aware of such interconnections, and there can be multiple and different manifestations of conflicts (Environmental Justice Foundation, 2003).

Prawn farming is an 'exemplar' issue which shares commonalities with other contemporary food-related issues (Lawrence, 2003 and 2004) in which food consumption is linked to ecological unsustainability and ethical concerns. An important aspect which characterised the choice of this controversy was, however, the practice of non-violence practiced by local Indian communities. In the Southern State of Tamil Nadu the local people had organised themselves into a non-violent movement, which has gathered supporters in both the local communities and internationally (Coppo, 2004). The protest has been going on for a number of years, with people organised in public rallies to raise awareness and gain support from people in the community (Figures 1-1 and 1-2).

Being in contact with people directly involved in the issue gave me the opportunity to listen to many different points of views and study constructive ways for dealing with conflict – steps that appeared to be in line with the purposes of civic education. An approach based on non-violence as it was practiced by the Gandhian community also seemed more respectful of other people and the environment, and could open new avenues for science education. A form of community-based, participatory democracy, such as the Gram Sabha, practiced in the villages, and still recognised by the Indian Government today, was introduced in the role-play simulation.

1.5 Preliminary investigations

What is reported in this thesis is an attempt to deepen understanding of the implications of using in school the role-play on prawn farming to deal with conflicts arising from socio-environmental issues. This research was built on some preliminary investigations, in which the prototype role-play on prawn farming was tried out in a number of different educational contexts: secondary school teachers and university students, and also with secondary school students, from different age groups, according to the reflective approach adopted by the research group. This preliminary work was fruitful in generating an overview of participants' reactions to the role-play¹, and it helped define the field of inquiry, in terms of difficulties and opportunities related to the use of this methodology.

In the first instance, taking on a role created some emotional difficulties. Adult players would need long periods of time to feel confident in their roles and able to participate. In contrast, younger students would feel generally involved (e.g. to quote one student: *'I felt I had an important part to take in the discussion of the problem'*) and there were occasions in which participating in the role-play triggered strong feelings, such as anger (e.g. another student said: *'It seems strange to me but during the debate I was moved to anger and I even felt like killing some people in the multinational companies'*).

In a very tentative way, this suggested that the activity had the potential to involve students' ethical development. However, much more needed to be understood about conflict and its resolution, as well as the social, emotional and cognitive processes involved.

This thesis is an account of the development of this exploration, dealing with successes and failures, and reflecting on the results achieved. The next chapter starts with a review of the literature on role-play in small groups, including decision-making processes and conflict. A final section in Chapter 2 addresses in more detail the pedagogical aspects of role-play, which form the basis for the study of the methods described in Chapter 3. A description of the role-play and the data gathering processes is given in Chapter 3, along with a first set of results obtained from the pilot studies. Building on the lessons learned, methodological aspects are revisited and reformulated at the end of Chapter 3, detailing the objectives and design of the main study. Chapters 4, 5 and 6 contain the results of the main study, which were derived from the analysis of students' discussions in role and conflict resolution. Finally, Chapter 7 gives an overview of the main findings, covering features of research methodology and learning, and reflects on the implications for science education.

¹ Preliminary results from these initial studies can be found in Colucci *et al.* (2000) and Marchetti and Camino (2003).

Figure 1-1 People’s rally in the Nagapattinham district, 12th June, 2006



In the picture below, on the left, one of the leaders of the non-violent movement, Krishnammal:

Figure 1-2 LAFTI (Land for tillers freedom)



2. Literature review

2.1 Introduction

This chapter builds the theoretical and practical basis of role-play. The field of study on role-playing as it emerged from the literature is extensive, involving contributions from the realms of sociology, psychology, language and education. This shows that role-play has illustrious roots and scholars before have used it as a methodology for understanding socio-cognitive processes. And yet its use in research (including education research) has been affected by controversy and debate. In this context, the contribution of this chapter is modest but focussed. A critical read of the literature on role-play suggests that this methodology can sit at the heart of epistemological controversies. It is argued that role-playing is a natural activity for people in society and this process has connections with civics education, but a clearer conceptual framework needs to be developed. The review of the literature has thus been helpful in identifying a set of assumptions related to learning through role-play from which to derive a set of core research questions, presented in Section 2.7, which will guide the empirical investigations that follow.

2.2 Taking on role and acting

Taking on role is a natural and spontaneous activity for children who play different characters (Harris, 2000), via a combination of knowledge, imagination and personal involvement. Role-players respond '*as if*' they were in a given situation, imagine how they would respond at that moment of time and feel what it might be like for them in reality (Mucchielli, 1993). Thanks to these imitational activities, children gradually develop their ability to take on family and societal roles. From infancy through adolescence, the activity of role-taking continues with specific characteristics which are codified within the environment of the family, the social norms, the cultural forms and values, and the affiliation to particular groups.

Claxton (2002) reports on children's' instinctive ability to 'pick up' mental habits and values from those around them. They learn from watching their elders, what to notice, what to ignore, what to laugh at and what to be afraid of. According to current theories on personality, experience of social contexts and roles shape the ways in which we 'see'

other people and relate to them (L'Abate and Bagget, 1997). By taking on a role we may experience what it might be like being in a situation, and develop empathy. In contrast, studies on autistic children associated an inability to communicate effectively with others with a difficulty in taking on a role (Karmiloff and Karmiloff-Smith, 2001; Harris, 2000). Such a wealth of empirical evidence suggests that role-play is central to the process of socialisation. This begins in the family environment and develops into the larger context of society, where meanings are attributed to actions. Looking at roles in society, Goffman (1959) provided the first extensive account of role-playing. He described the process of action in society as the process of playing a role in front of an audience, which may be real or imaginary. According to the model, any physical setting is a context for a presentation of an individual to the audience, and such presentation involves gestures, words and appearances, which are the means by which the individual in role expresses himself/herself in front of the audience. For example, clothing, accents, and manners convey messages to others about who we are, and especially how we want other people to see us. Quoting Goffman:

'It is important for us to realise that we do not as a matter of fact lead our lives, make our decisions, and reach our goals on everyday life either statistically or scientifically. We live by inference' (Thomson, O. quoted in Goffman, 1959, p.15).

Hence in the world of society, being in role equates to action and participation: a role typically exists when is presented to others and its performance contains strong cognitive features, which inform both the audience and the performer with an understanding of the action which takes place in a particular context (Landy, 1993). In the model of the theatre however, the spontaneity of our actions in role is paradoxical. Landy (1993) effectively pointed out that playing a role equates to learning a part, with the appropriate words, cues and gestures, and that such spontaneity is achieved through rehearsal. By the same token, Billig (1987) remarked that failure to act out the role is likely to lead to a break in the action, and a pause in the unravelling 'scene'. This points to the silent interaction between actor and audience, and the fact that functional role-performance in the world of the theatre is based on the established parts and expectations.

In this respect, Goffman's dramaturgical model can be explored further to gain some understanding of how society works, by looking at the characteristics of public performances.

2.2.1 The order and rationality of public performances

In the dramaturgical model of Goffman, a great deal of emphasis is given to the performance of professional public roles. Focusing on familiar figures, such as doctors, lawyers and judges, Goffman (1959) described such roles as being characteristically performed through routine-like practices of well-learned speeches and gestures, corresponding to public expectations, and standards of public acceptance. In describing the interaction between performers and audience, Goffman elaborated the concept of 'teams': people in public roles will be acting together as members of a team, to provide a consistent image of their profession before the public audience. In practice, members of professional teams find themselves in a relationship of reciprocal dependence: within the team, they learn about the rules and procedures of their role, and they build consensus. More recently Higgins (2000) explored the cognitive features related to role-performance: *'institutional norms and social expectations operate as imperatives concerning a person's cognitions, as well as his or her conduct and behaviour'* (p.36). For example, just preparing for role-enactment can influence how information is encoded and retrieved in the memory, and even reasoning can be influenced by role enactment (e.g. the use or not use of information, as reported by Zukier and Pepitone, 1984). Hence role-performances are central to a notion of societal functioning; professional performers spend much of their time in the public domain, as opposed to the background regions which are dedicated to learning the part. They interact effectively with few other colleagues and are able to perform a number of integrated tasks associated with the role. They know what is expected of them and what their responsibilities are. From a sociological and political perspective, public consensus and expectations keeps people firmly in their roles and contributes to organisational functioning. However, what is not accounted for in the world of public performances is the other aspect of societal life, which is to do with change of structures and ambiguity of roles. This includes cognitive, social and emotional challenges, which I will introduce by starting from an examination of teams and the building of consensus.

Taking a closer look at intra-groups interactions, Moscovici and Doise (1991) described the act of giving consent as the willingness of the individual to associate with others. This is equated to a psychological need for associating. According to Moscovici and Doise, people in group have a tendency to smooth down the divergence of ideas and compromise in order to reach consensus. For example, in a series of experiments with small groups, Moscovici and Lage (1976) observed the effects of the infiltration of a 'plant' in a group, with the task of taking an opposing view. In one of the experiments, the plant suggested that one of two roads of equal length was clearly longer than the other. After a while, members of the group began to show some agreement with the plant. However the authors also noted the influence of a consistent and self-confident minority in shifting the focus of attention of the group and affecting the nature of consensus. The authors concluded that often it is the individuals' disposition towards the search for agreement that may guarantee people's engagement in the decision-making process:

'the more one is personally involved, the less likely one is to change and act with others... extremist individuals who are generally more committed and more sure of their opinions stand firm on their position. Only moderate individuals, normally less involved and more uncertain, modify their opinions, in order to draw closer to one another' (quoted in Moscovici and Doise, 1991, p.103).

In the course of interaction in small groups, the following factors appear to be affecting the nature of consensus and the ease in which this is achieved (Moscovici and Doise, 1991):

- degree of involvement of the individuals (e.g. interaction in a 'cool' or in a 'warm' atmosphere);
- influence of the setting on the quality of verbal exchanges (e.g. face to face versus meetings with people aligned in a row of chairs);
- procedures (free discussion versus formalised discussion);
- the content of the matter under discussion, and the values involved.

For example, in public institutions, the authors remarked how the search for consensus is actively sought through an organised set of formalised procedures: prior decisions upon the agenda, the allocation of a specific time and the existence of a hierarchy of

specific roles and functions (e.g. the chairman, the secretary, the audience...) have the purpose of 'ordering' and 'channelling' communication, and this improves the search for consensus. In another context, Head (2003) and Humes (1986) pointed out a tension between engaging at deeper levels of communication by sharing new meanings, and finding consensus, as this involves questioning consolidated traditions and power structures. By the same token, Sherif (1966) argued that professional interests can only be maintained at the expense of those who are considered to be lesser able and lesser 'experts' (Sherif, 1966): in the socialist framework, traditional forms of decision-making are considered means for exclusion because their structures prevent people from effective participation. The criticism of the socialist literature is helpful here to draw attention to the political dimension of collective actions in role. The studies of Moscovici and Doise (1991) showed that there is a tension between convergent and divergent modes of thinking, between finding consensus and expressing dissent. People in groups tend to reach agreement by a compromise and this is important to societal functioning. Equally possible, however, is for people in group to 'take sides', by aligning themselves on opposed positions. In a situation where groups are 'polarised', communication between the parties breaks down. The parties involved withhold information, reject influence, and reinforce mistrust about each other (Butler, 1995). If the aim of this work is achieving engagement of heterogeneous groups and young people on common matters, which are political in nature, this will require understanding of the mechanisms for achieving consensus and for the expression of values. In turn, this would entail inquiring upon modes of thinking and communicating, as will be explored in the following section 2.3, and uncovering the uncomfortable dimension of conflict (in Section 2.5).

2.3 Small groups' discussions

2.3.1 Roles, values and emotions are communicated in the course of verbal exchanges

Mead (1955) defines human communication as a coordinated exchange of 'significant symbols' or meanings. According to Mead, when an act of communication is established between two individuals, A makes a significant act which B perceives. During this process, the individual starts looking at what the other person might mean with his or her actions and with his/her behaviour and takes on the role of the other. While we are

performing a role however, each of us whether adult or child, is also expressing personal values and beliefs, and this process is associated with an emotional dimension:

'The self may experience fulfilment in value-expression, guilt at value violation, anxiety in value conflict, enhancement through the harmony of perspectives, and in the unfolding of a project the self may choose to reject some values and take on others' (Kitwood, 1972 p.88).

Besides, each act of role-taking involves complex modalities of interpersonal relations. This can be noted in the spontaneous verbal exchanges between children that 'play doctor', in the jargon-enriched dialogues between professional figures, or even in the metaphorical exchanges found in the political arena (Humes, 1986; Gee, 1999). Additionally, depending on the roles and the context, the subjects can develop a certain degree of empathy with their interlocutors. Hence the emotional dimension may involve feelings which are derived from personal experience but which can also be imagined in other people, or even felt as if we were another person, by putting ourselves in the other person's shoes (Kitwood, 1972; Gilbert, 2005). This sets an important difference from stage performance, as the sense of self is not lost. Following the work of Hyde, Heron (1992) indicates empathy as the ability to see with both the eye of oneself and the eye of the other, and this is associated with the capacity for participation and presence in interaction (Hyde, 1955, reported in Heron, 1992). Alongside cognitive and social features, playing a role also involves an emotional dimension, and this is important for understanding the nature of the interaction in role, depending on context, and the roles which are performed at any particular time. A vast literature can be found on the topic of verbal interaction: I will only summarise here some main points which can most usefully inform the practice of role-play in educational contexts.

2.3.2 Open discussion

In the context of discussions between people in role, Bridges describes (1979) the process of open discussion which can take place between people about an open problem. In Bridges's model of *open discussion*, participants are disposed to understand, examine and to 'take on' or be affected by opinions other than one's own. Discussion is described by Bridges as a subtle process of 'give and take' and mutual

accommodation of interests and opinion. This model of social interaction is more akin to that of the market place, and in this view, even forms of hypothetical thinking (for example the 'if...then...' structure) reported by Pontecorvo and Sterponi (2002) in studies of informal learning through family dialogue, can be reinterpreted as forms of *bargaining*: if you do that, then you will do that too. Hence discussion as a form of oral deliberation can include different forms of knowledge, depending on the context.

In Bridges' terms, the central function of discussion is the improvement of knowledge and/or judgement on any matter. This involves the active discussion of evidence, and even carrying out decision-making in the absence of unquestionable evidence. Nothing is simply taken for granted, and people would discuss until they reach satisfactory understanding. A goal for such discussion can be that of sourcing and pooling a variety of information and this is often strengthened by the different backgrounds and specificities of the group members. In this case, open discussion can be used for developing and expanding an idea, solving a problem or indeed for the beginning of imaginative conjecture. This operation starts with 'think tank' or brain-storming processes and leads to the generation of new ideas. Quite differently from the polished arguments found in literary texts, in oral discussions the talk may be *interrupted*, enriched with examples and accounts from personal experience. Clarification, exemplification and evidence can also be demanded.

This approach resonates with socio-cultural theory, which values people's ability of using language as a means of thinking together (Mercer, 2000). Building on the work of Falk (1980), Maybin (1996) refers to particular patterns of talking in which the partners hold '*mutual knowledge of a topic, equal authority to express it, a sense of camaraderie between them and a common communicative goal*' (Maybin, 1996 p.177).

According to Bridges, the procedure of open discussion is based on the development of inviting and non-threatening *attitudes* in order to protect the divergence of views. This is opposed to competitive and selective approaches, such as argumentation, in which participants' intentions are single-mindedly to defend one position or attack another. Under the circumstances of open discussion, Thomson (1970) notes that:

'the commitment to a discussion relies on a fundamental preference for non-violent politics, and may be held even at the cost of delaying what are considered to be the

right solutions. It represents a belief in the morality of discussion; only through accommodation, compromise and reasonable persuasion which are the hallmarks of democratic discussion should men qua moral and rational creatures be moved to action' (Thomson, quoted in Bridges, 1979 p.22).

During discussion, participants have the opportunity to consider their own situation in a more objective manner in the light of other people's perceptions and ideas. Equally, they may be able to envisage what may be the outcomes and the developments of a situation which is yet uncertain. The literature on open discussion however contains little empirical work about decision-making processes and the quality of the decision that people can make through discussion. For example, participants may feel the urge to reach any consensus at all, or they may resort to voting (Bridges, 1979), in order to withdraw from the uncomfortable condition of uncertainty.

2.3.3 Deliberation and advocacy

In Billig's (1987) rhetorical approach, communication exchanges between people are mediated through roles and are assimilated to the process of argumentation. This is dissociated from situations, such as debates or quarrels, in which there are feelings of anger, and people are ill-disposed one to another. Solomon (1998) described rhetorical dialogue as the process of 'showing' what are the personal views on the situation, to explain where one is coming from as regard to knowledge, values and experiences, and this can be done by means of '*roles, examples and counter examples*' (Billig, 1987). This is a dialogical process, which can take place in physical interaction, or just in the mind of the speaker, who can suspend his view and contradict himself for a moment, in order to allow the other interlocutor to take on a turn. The examination of different perspectives in decision-making is often associated with an intense thought process. According to Billig (1987), 'to think about' a course of action is more than simply gathering information. The action which follows from a decision can have impacts on the speaker himself and/or others. *Deliberating* is thus the action of imagining risks, acknowledging uncertainties, envisaging future consequences and assessing the desirability of different outcomes. The case for one decision or the other is scrutinised with its changing sets of justifications and criticism and there is tendency to put off the moment when oscillation has to be ended and a decision made.

In contrast to open discussions and private deliberations, Juries and Courts of Inquiry are characterised by a more logic style for decision-making: advocacy. In such contexts, the deliberator comes to resume the case of two or more contesting speakers 'rolled into one person'. The deliberator takes first the role of one and then that of the other: *'If people can deliberate, first by advocating one side and then by advocating the other, then they are possessed of the skills of advocacy'* (Billig, 1987 p.186). Advocacy can be played also by two people, with one speaker advocating a single position and another speaker advocating a contrary position. In this way, the rhetorical image of advocacy draws attention to two sides of the person, the perplexed deliberator and the determined, forthright advocate. To this regard, Dehler *et al.* (2001) argued for the educational potential embedded in rhetorical practices, which they conceptualised in the form of paradox as a pedagogical tool. 'Working through paradox' entails encouraging people to define and even exaggerate their polarised perceptions, thereby tapping their natural tendency to stress contrast over connections (Bateson, 1972; Gehrke, 1998; Lewis and Dehler, 2000). The objective is to develop capacities for *paradoxical thinking*: the ability to comprehend the complicated interplay of opposites by picturing a paradox in its more complete surroundings (i.e. recognising the historical, ideological, political, and social context underlying perception). This will be applied in the role-play in Chapter 6, in the context of dialogue between two irreconcilable points of view.

2.3.4 Role-play and language

Through recorded verbal exchanges within a group it is possible to assess which are the prominent types of interpersonal relationships (Mercer, 2000). However, revealing participants' assumptions and the rules which are at the basis of any relationship can be a far more difficult task. Critical discourse studies for example have focused on *'language as a cultural tool, mediating relationships of power and privilege in social interactions, institutions and bodies of knowledge'* (Rogers, 2002 p. 251). The outcomes of the interaction can be strongly influenced by the setting of the interaction and the power relationships between the group members which may not allow open discussion and genuine exchange to take place. Participants may hide specific assumptions by the use of specialist language and metaphors (Cassidy, *personal communication*, 2004), and may not be aware of the idiosyncrasies of value-positions and actions between participants (Fang, 2005).

In the context of language studies, Gee (1999) made a helpful distinction between two types of discourses, sets of meanings which people can exchange when they are playing their roles. The first type, little 'd' discourse, refers to language in interaction, whereas the second type, capital 'D' Discourse refers to *'socially accepted associations among ways of using language, of thinking, valuing and acting, and interacting, in the right places and at the right times'* (p. 17). In other words, both discourses are present when roles are effectively performed in public interactions. For example, a scientist presenting her work at a conference enacts a scientist Discourse, by using language in a certain way, but also by thinking, acting and interacting in certain ways. Discourses are formed and transformed in moment to moment interactions, but they are also inextricably tied to history and culture (Carlone and Webb, 2006). During the interaction of people in role, it is thus likely that the two discourses will be acting at different levels, in the management of the interaction, and the creation of new meanings (this will be showed in the analysis of the data in Chapters 4, 5 and 6). In complex situations, which are characterised by people holding a variety of points of view, there can be a multiplicity of means for expression and interaction. While some theorists have advocated for discussion setting in which people participate through shared leadership and mutually legitimated expertises (Funtowicz and Ravetz, 1999), other authors pointed to the impact of existing structures on the selection of what counts as relevant knowledge and preventing new meaningful exchanges (Davies, 2003).

To consider the outcomes of a discussion in role thus implies a shift from a theoretical description of verbal exchanges, to a reflection on the nature of the discussion setting, and the practical consequences of the verbal move (Abelson and Levi, 1985). Walton (1992) classified six possible modalities for argumentative discussion (Table 2-A) which are aimed at decision-making, and their possible outcomes. Table 2-A refers to the original classification given by Walton, with some additions derived from the field of rhetoric.

Table 2-A Argumentative discussions with potential for conflict

TYPE OF DIALOGUE	INITIAL SITUATION	INDIVIDUAL GOALS OF PARTICIPANTS	COLLECTIVE GOAL DIALOGUE	OUTCOMES
PERSUASION (which might also include critical discussion)	different opinions	persuade other party	resolve difference of opinion	understand positions
DEBATE	adversarial context	defeat third party	winning arguments	spread information
INQUIRY	ignorance, conjecture	contribute findings	prove or disprove	may lead to gathering of further evidence
NEGOTIATION	conflict of interest	ensuring gains	settlement (without undue inequity)	maximize gains (self-interests)
QUARREL	personal conflict	verbally hit out at and humiliate opponent	reveal deeper conflict	vent emotions
DELIBERATION	contemplation of future consequences	act on a thoughtful basis	formulate priorities	promote personal goals

The classification above displays different kinds of interaction between roles. The work of Moscovici and Doise (1991) is once again useful here, to recognise that consensus, such as that obtained via negotiation, may just be the minimum level of agreement that can be reached:

‘it reflects the difference between the ideas and opinions of the group members, without changing them’ (p.29).

This outcome represents the solution through which every member gives up something important, but not vital, for the sake of gaining the support of the other members. It is the social affiliation which counts, and not the individuals’ needs. In addition, Moscovici and Doise (1991) observed that the skilful and careful management of dissent and divergent thinking can lead to a consensus of a higher order. Hence dissent is equated to power for social change. However, an important implication is that the decision may take longer than compromising or establishing agreement over a set of concessions. An important requirement is that the group’s attention shifted from the content and goals of the discussion, towards the reflection on the adopted means and procedures. In this way, the focus of the discussion changes from discourses of power or the search for truth, to the methodological level of finding mutual understanding and

bonding elements. Such observations led the authors to conclude that while on the surface the various parties may appear to be setting agreements over apparently unrelated matters, underneath individuals would gradually move towards new and commonly shared ‘social representations’.

In epistemological terms, Katz (2000) looked at processes of collective engagement as the ground for a notion of knowledge which arises in the subjective activities of particular subjects. Recognising and relating the subjective and collective dimension requires that notions of the truth be substituted with “that which is taken to be true” (Katz, 2000 p.141). This has resemblance with Berger and Luckmann’s (1967) notion of inter-subjectivity, as the process which allows personal opinions to be shared and turned into accepted, cultural conventions, which are taken for granted, and accepted as truth. We can then begin to see here that the process of decision-making based on discussion has the potential for enabling individuals to approach new models for social interactions and even consider the possibility to introduce change in socio-cultural and socio-political practices. I will further expand on this point in Section 2.5 which discusses strategies for allowing dialogue between roles with different power positions with the purpose of initiating change. In this context, two elements will be considered because they are central to this work. First, in Section 2.4 there is an exploration of the literature on discussion and argumentation in the context of science education. Second, in Section 2.5 there is an exploration of non-violent discussion and how this can be used to reflect upon responsible decision-making and actions in the wider socio-environmental context.

2.4 Arguing and thinking in the context of science education

2.4.1 Approaching the consensus of science

Recent research in science education has placed great emphasis on argumentation strategies, to develop students’ abilities to make evidence-informed judgements on issues of controversy involving the sciences. Duschl and Osborne (2002) for example suggested that a model of logical thinking such as that one theorised by Toulmin (1958) could be used for teaching about argumentation, by training students to produce valid argumentative sequences. One particular feature of argument, the *warrants*, was considered as indicators of students’ abilities to discount false propositions in the light

of the given evidence. Logical thinking and the use of evidence would thus be a means for students to find their way through the messy scenario of scientific controversies and to experience the consensus of science, which is '*superior to competing viewpoints*' (p.45). So if people were taught the rules of argumentation, they would easily engage in a constructive and speculative argument as their sole '*motive for arguing would be the search of knowledge and understanding*' (Duschl and Osborne, 2002 p.53).

The emphasis on teaching scientific argumentation is often seen as a solution for a common problem in science education. Grace and Ratcliffe (2002) and Jimenez-Aleixandre (2002) identified a rift between scientific concepts and the values held by the students. At another level, Hart, (2002) and Gough (2002) have criticised current perception of conflicting agendas of science education and environmental education, with one focussed on knowledge, and the other one focussed on value issues. Findings from a range of different studies adopting the same model (Kuhn, 1991 and 1993; Zeidler, 1997) showed a mismatch between the model of logical thinking and the way in which people make their decisions and interpret events. The term 'fallacious thinking' indicated people's tendency to discredit evidence which conflicted with their initial core beliefs about moral, ethical and social problems, and conflict may arise in the discussion (Zohar and Nemet, 2002, pp. 52-53). Current views of argumentation might thus oversimplify the extent to which disagreement can be contained in an argument, may suppress the legitimacy of students' points of view, and misrepresent what is a complex context of learning through meaning-making in the classroom (Lidar, LundQvist and Ostman, 2005). Perhaps it is because of this excessive simplification that some authors have warned science educators about the shortcomings of such model (Solomon, 2006, *personal communication*).

2.4.2 Discussion and problem-solving

An interesting perspective on argumentation is offered by the realm of language studies. Drawing on the work of Halliday (1975), Dodman (1999) underlined the link between types of language and means of knowing and representing reality. In his analysis, the written language, such as that of the philosophical argument, and the scientific language, are both means which deliver a condensed and synoptic view of reality. When expressing ourselves in writing, or with the use of the specific language of science, we may display our reasoning abilities, yet what we express is destined to be a static object. What is delivered is essentially a 'knowledge product', with often no direct expression

of agency (e.g. the passive form is frequently used), motives or intentions. Arguably, this seems to be in contrast with current science-based controversial issues, in which agency and attitudes play a central part, and the multiplicity of actors and points of view account for much of the complexity of the issues.

Drawing on the work of Resnick *et al.* (1993), Pontecorvo and Girardet (1993), Sprod (1997), one way to analyse students' discussion would be to focus on describing the nature of the verbal exchanges between pupils and on how these contribute to or prevent the unfolding of conversations. For example, one aspect of students' talk may deal with selecting valid and relevant information, while another may be concerned with the students' personal explanations and interpretations of particular events (i.e. defining categories and words, interpreting actions, plans and intentions). Additionally, some verbal moves can be supportive of other moves and contributions, while at other times pupils may find it difficult to take part in the exchange and move it forward. All such models depart from many formal and informal studies of reasoning, in which only premises and conclusions are regarded as components of arguments, to assimilate students' discussions to a 'problem solving process whereby people generate and infer means to achieve ends according to principles of cooperative action' (Jacobs and Jackson, 1983, quoted by Walton 1992 p.164).

In naturalistic contexts of discussion, students would then express their own views and ideas and make balanced judgements, as a result of a cooperative activity (Gayford, 1993). Alongside the ability to achieve a strategic competence, which is knowledge of the procedures for working effectively with others, other authors have pointed out to a meta-strategic competence, which develops from discussing with others and finding consensus (Howe, Tolmie, Val Duchak and Rattray, 2000). Drawing on the work of Kuhn *et al.* (1995), meta-strategic competence requires the meta-cognitive competence '*to reflect on and thereby achieve distance from one's own theories – to 'bracket' them sufficiently that they are not allowed to dictate the ways in which evidence is processed*' (Howe *et al.* p.112).

For Howe *et al.* (2000), the key to such learning is a task design which requires pupils to discuss different positions and then agree, before embarking in further experimental activities. Finding consensus in this sense impacts on the cognitive level and expands students' abilities to develop understanding of a particular topic or problem. This is

important here and will be applied again in Chapter 4, where students will be encouraged to explore complex issues from somebody else's point of view which may be different from their own personal opinion. However, the topic of the discussion also plays an important role. As pointed out by another group of cognitive psychologists (Williams and Tolmie, 2000), the ability to find consensus is conducive to greater understanding of biological topics. The authors note, for example, that evidence in favour of progress through conflict resolution stood in contrast to the pattern in physics studies, in which change appeared to hinge on conceptual dispute alone. Hence the conclusion was that children's understanding is influenced by the complexity and transparency of the phenomena, in other words by the possibility to arrange relationships in different ways, and beyond what is visible. Conceptual change in this case is linked to procedural change, because the way in which we learn impacts on what we learn.

2.4.3 The implications of taking on a role

Studies on persuasion showed that people can be affected by the form of the message, as well as its content (Petty and Cacioppo, 1986): people can become active seekers and manipulators of information, and revise their system of beliefs. In the context of a socio-environmental controversy, another kind of activity would be that of using role-play for expressing values, by putting oneself in other people's shoes. For this kind of activity however, consensus may be more problematic. Personal knowledge is not restricted to cognitive matters, and the incorporation of a new idea into one's personal framework of understanding involves more than its rational appraisal for intelligibility, plausibility, or fruitfulness (Posner *et al.* 1982). A person's social and cultural identity – comprising gender, ethnicity, religion, politics – impact very considerably on learning (Barnett and Hodson, 2001), as people have to integrate their understanding into existing value positions, models and assumptions of how the world works (Harré, 1998), and the various social contexts in which they are located. Helping young people to put themselves in other people's shoes can be a means for seeing the world from another perspective (*decentering*), learning to understand the reasons for the feelings of others. In fact, young people may be aware of the values of some roles, but be ignorant of the values embedded in other roles (Kitwood, 1972).

While desirable however, empathy is a process that tends to be selective, and in some measure situational (Lifton, 1993; Nickerson, 1999; Verducci, 2000). One may be able to think and feel into one person's experience and not that of another, and do so more at certain times and places. Individuals may vary in that capacity, depending on their age and maturity. Hence one of the problems which may occur with role-playing is that of experiencing a series of temporary identifications in which one may 'lose oneself' for a time, or not be able to understand the other. Similarly one's limited empathy for particular persons or groups may be quickly overwhelmed by destructive emotions, such as anger, rage and violence (Shott, 1979). For the purpose of this work, students can take part in an activity which enables them to approach the ethical dimension of the topic by expressing their values and ideas, and listening to the voices, values and perspectives of other people. This aspect will be further explored as part of a set of methodological justifications in Chapter 3.

In relation to science education in particular, to take on a different perspective can be a means of developing the ability to reflect on the social structures, the accepted conventions and the rules through which a society is organised, and which shape culture and values (Giroux, 1997; Aikenhead, 2006). Through Goffman's emphasis on roles and norms, we know that the performance of a particular role carries the accepted conventions and cultural projections about the world, which are encapsulated in sets of established beliefs. As opposed to the organised structures of Western science, other forms of knowledge may be local, intuitive and qualitative descriptions of specific contexts². In this work, the global dimension of the role-play will bring students to 'see' the situation from the more familiar perspective of people from the Western world, as well as other local people, native communities that have long developed a concept of their own identity as embedded with ecological knowledge and practices (Ingold, 2000).

In sum, the simulation of a real, complex and controversial issue, for which people do not only have different perspectives, points of view, knowledge and experiences –

² Western based formal knowledge tends to be supported by written documents, rules and regulations, and technological infrastructures. Informal, indigenous or local knowledge refers to the complete bodies of knowledge, know-how, practices and representations that are maintained and developed by people with long history of close interaction with the natural environment. Indigenous knowledge and modern science should be seen as two systems of knowledge that can supplement, rather than compete, with each other (SciDev.net, August 2002. <http://www.scidev.net/dossiers/>. Website visited on April 21st, 2005; extract reported in Colucci-Gray *et al.*, 2006).

perhaps to the point of conflict – could allow students to experience those interconnections between Science, Technology and Society that characterise our time and have significant impacts on our lives. With respect to using role-play as a means of teaching such interactions, the following section contains a more in-depth review of approaches for dealing with conflict, which will constitute the baseline understanding for a set of methodological considerations presented in Chapter 3.

2.5 Non-violent discussion and the passage through conflict

A growing number of conflicts associated with the use and allocation of natural resources lies at the core of socio-environmental controversies. In this view, traditional forms of democratic decision-making (victory by majority, voting and deliberation) are unsatisfactory in representing interests and motives of different societal groups (Pellow, 1999). According to Deutsch (1973), conflict takes place whenever incompatible activities occur. An activity that is incompatible with another is one that prevents, blocks or interferes with the occurrence or effectiveness of the second activity. Conflict occurs on different scales: it can originate in one person, between two or more people, between two or more groups, or two or more States.

Three classical situations can be referred to:

- Dilemma: one person, or actor, pursuing two incompatible goals. This has been likened to an internal conflict, a personal state of uncertainty in which a choice is presented between two options that are equally valid.
- Controversy: is a dissent between opinions or points of view, which makes it difficult to make a decision on the different assumptions, but it does not necessarily imply conflict (for example in science there can be a number of different theories that are used to make sense of the same phenomenon).
- Conflict: is a relationship between two or more parties which are involved at a personal level, and can be antagonistic. Conflict is associated with negative emotions and a sense of sufferance: high stakes (material or immaterial) guide the actions of the competing actors. Depending on its duration and the number of actors involved, a conflict can increase in both intensity and scale.

In most cases conflict arises as a combination of elements, as defined by Hocker and Wilmot (1995):

'Interpersonal conflict is an expressed struggle between interdependent parties who perceive incompatible goals, scarce resources and interference from others in achieving their goals' (p.21).

Such situations are disruptive of social relationships and people may have feelings of anger and exasperation.

As Galtung (1996) defined it:

'Deep inside every conflict lies a contradiction, something standing in the way of something else. A problem in other words' (p.70).

In search of a theory of conflict, I shall refer to the work of Galtung and others in this field that placed emphasis on the opportunity to learn from an experience of conflict:

"Energy is created by the conflict. This is a reminiscent of the classical double-character definition of 'crisis', a concept in the neighbourhood of conflict, as 'danger' + 'opportunity'" (Galtung, 1996 p.70).

According to Galtung conflict can be described as a triadic construct, made of:

- A. the *hidden assumptions, attitudes, feelings and representations*, which originated by the conflicting relationship (or contributed to the arising of conflict),
- B. the *displayed and manifested behaviour*, which may not always be clearly explicit,
- C. the *content of the conflict*, which is the *contradiction* perceived personally as the object for which the parties are contending.

The three elements are interconnected although not all of them are always equally visible. Both a manifested and a latent side to conflict can be identified: the first one being the behaviour that the participants can observe, and the second being the theoretical, inferred level of the attitudes and goals. Arielli and Scotto (1998)

underlined the importance of recognising and 'bringing to surface' the psychological components in a conflict, as they often invisibly shape the course of the interaction. For example, negative feelings which are associated with people's interpretations of the events are a cause of distorted perceptions, which consolidate prejudices and diffidence. In educational terms, to perform a role in a situation of conflict equates to bringing such psychological features to surface through dialogue and self-expression. The field of psychoanalysis appears to make an important contribution on this point underlying consciousness as the site for deep-seated violent images (Berger, Berger and Kellner, 1973), which can become part of a culture's shared images of conflict.

For the purpose of this work I will briefly review the writings of three main authors (Patfoort, Galtung and Pontara) who have made important contributions to the analysis of conflict. All such authors depart from acknowledging conflict as an embedded component in personal and collective life; they all consider an unbalance of power between the parties as the origin of a violent situation in conflict and propose to deal with conflict through the practice of non-violence, following the teaching of Gandhi. The theory of non-violence as described by these authors is illustrated here by focusing on three main aspects:

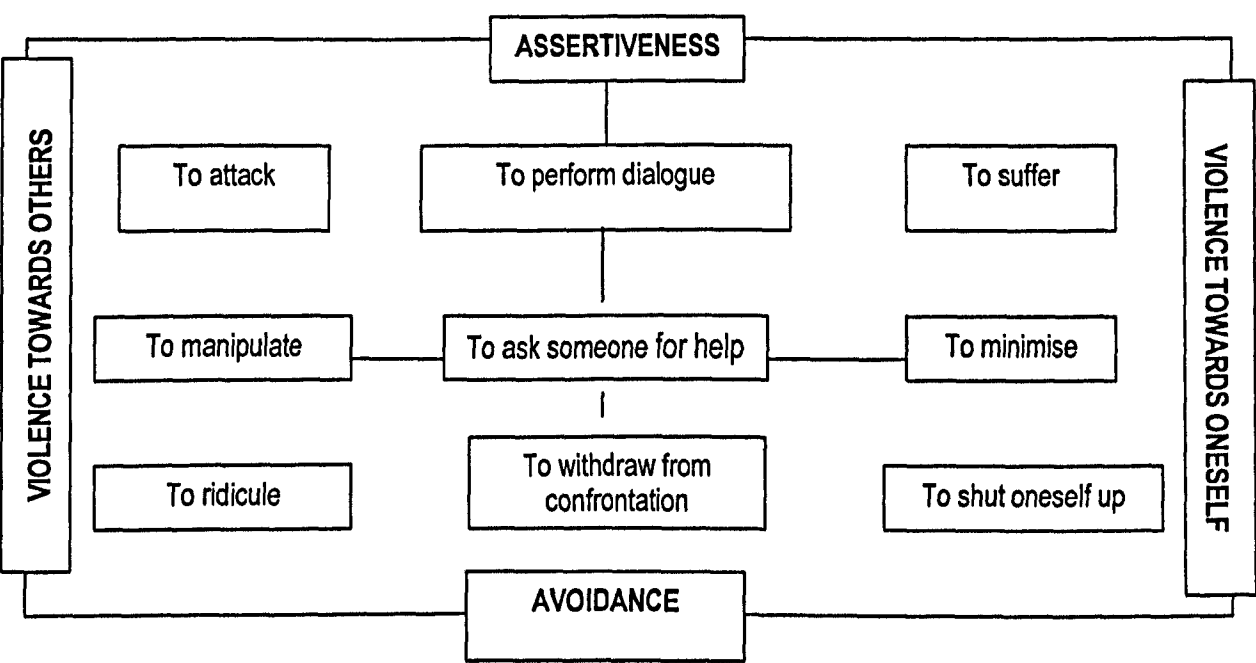
- a) people's attitudes and behaviours in a situation of conflict (Section 2.5.1),
- b) the expected outcomes and consequences (Section 2.5.2),
- c) the processes and modalities for handling conflict (Section 2.5.3).

2.5.1 Attitudes and behaviours in interpersonal conflicts

Patfoort (1995) noted that attitudes and behaviours in conflict are dependent on the parties' perception of their power within the relationship and this affects their communication. Argumentative strategies are often used for gaining the balance of power, such as emphasising the positive aspects of one's point of view at the expenses of the other's, derogating the other's point of view and making attacks *ad hominem*. The diagram presented in Fig. 2-1 displays a simplified network of behavioural patterns in interpersonal conflict, which originate from the two main poles of assertiveness and avoidance (modified from Camino and Marasso, 2004). '*To perform dialogue through empathy*' and '*to ask for help*' are presented here as the two constructive approaches to personal conflicts. In line with Padfoort (1995), a

constructive approach to conflict can be developed in relation to a context of power-equivalence which encourages reflection, empathy and open communication. This will be used as a template for observing and categorising episodes of verbal interaction during the role-play simulation and to tap into students' feelings and perceptions of conflict.

Figure 2-1 People's attitudes in interpersonal conflict



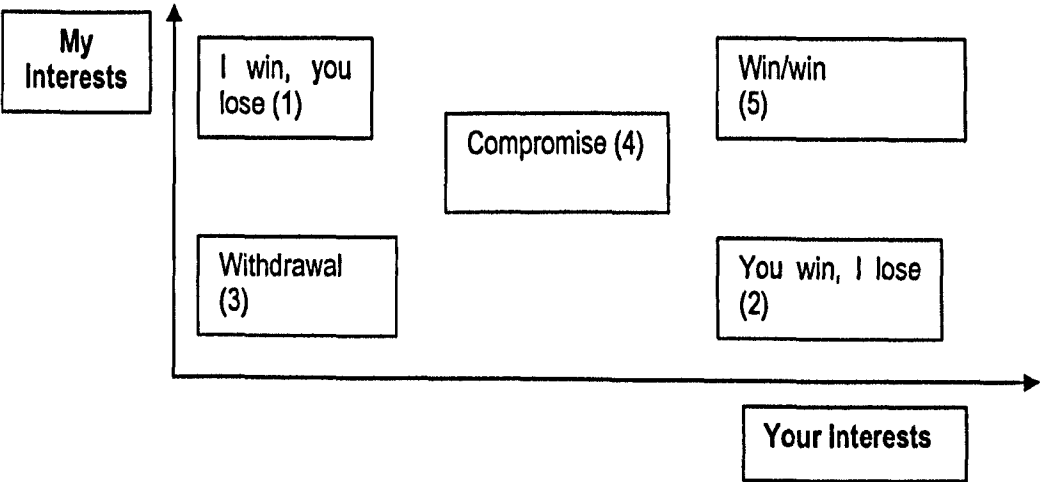
2.5.2 Dealing with conflict between groups: an overview of different outcomes

As suggested by Weber (2001), the different approaches to dealing with conflict won't be prioritised as steps in a linear temporal sequence. Rather the path towards conflict resolution can be characterised as a constellation of different scenarios. For example, conflict may be seen as a specific instance in time and an obstacle to be eliminated. This is the view which is usually taken by power-related forms of dispute settlement, such as military actions but also by some non-coercive conflict management approaches, such as judicial settlements, arbitration, legal awards and direct bargaining (see for example Davies, 2003). In contrast in the view taken by Azar (2003), conflict is an inseparable part of social interaction between two or more parties. Therefore conflict is a problem that the parties have in common and that they can solve together. Practitioners following this approach distance themselves from top-down conflict management approaches, and seek to manage the conflict through a non-coercive, cooperative process, aimed at promoting positive behavioural changes in the parties

involved. The final aim is that of turning the ‘win/lose’ zero-sum environment of traditional diplomacy, into a ‘win-win’ situation. In recent years, a debate has arisen on the applicability of these two perspectives, win/lose and win/win. Focusing on environmental conflicts, Hoffman *et al.* (1999) is sceptical about many definitions of win/win, which only loosely refer to reaching any solution at all: feelings of satisfaction or the act of compromise would only be sub - optimal balances. Similarly, Azar (2003) pointed out to the need to make a distinction between interests, which can be negotiated, mediated or bargained over, and needs and related values, which cannot be traded or repressed as mere interests or material needs. According to Azar (2003) material needs are interwoven with psychological needs, such as desire for recognition, inclusion, and identity. Therefore a compromise in material resources may not be sufficient to address the gravity of the problem at hand. In this view, the resolution of the conflict can only be possible through fulfilment of innate human needs, which transcend cultures and contexts (Burton, 1997; Ross and Rothman, 1999; Azar, 2003, Fisher, 2003), and make the problem of dealing with conflict a problem of social and environmental sustainability.

A synthesis of a variety of outcomes for the conflict resolution process can thus be outlined as follows (Figure 2-2). In the diagram, the horizontal axis shows your interests, while the vertical axis shows my interests:

Figure 2-2 Conflict outcomes (modified from Fisher *et al.* 2000)



In the Figure, five scenarios for dealing with conflict are described, each one leading to different outcomes which may be favourable to the interests of either party (scenarios 1, 3, and 2) or both (scenarios 4 and 5):

- (1) 'I gain everything' and 'You lose it all' or
- (2) 'You gain 100%' and 'I get nothing'. Outcomes (1) and (2) can be achieved through a verdict or a sentence which establishes right and wrong doings between the parties.
- (3) Is the status quo and the non engagement with finding a solution (withdrawal, escape).
- (4) There is the possibility of compromise, through which gains are split in half and half between 'You' and 'I'. This result can be achieved through some forms of mediation and negotiation.
- (5) Both 'You and I' achieve near maximum gain, but always more and different from what they could have achieved through compromise. This is the result of some win/win approaches and the non-violent dialogue.

It is important to note that such scenarios were derived on the basis of the interests at stake, and we will see in Chapter 6 that in a situation of conflict, a distinction will need to be made between interests and needs.

2.5.3 Non-violent approaches to socio–environmental conflicts

The debate on the win/win approaches and negotiation is particularly relevant to understand socio-environmental conflicts. According to Renner *et al.* (1991), political attention tends to be focused on immediate problems and their severity (e.g. the atmospheric pollution) while the conflict scenario may be far more complex. Interconnected elements and secondary effects can stretch over longer time-scales, in the past and in the future, and may involve many groups and countries. As a consequence, loss and degradation of environmental resources has become a source of international conflict, due to both competitions for resources, and to the tendency of environmental impacts to cross state boundaries. Buckles (1999) and Sachs (2002, 2003) stressed that natural resources are far from simple objects of negotiation: they are immersed in a space of social interconnections, in which the relationships between the various actors and with the environment are multi-faceted and often unequal. Pointing out the intensity and gravity of macro level conflicts arising from the misuse of natural resources, Sachs (2003) draws attention to the need to address issues of justice and human rights:

'resource conflict break out in the poor countries of the periphery, where the struggle centres, if only at local level, on nothing less than rights to the biosphere. By virtue of man's biological nature, some of these rights are inalienable. If they cannot be guaranteed, a conflict over resources turns into a conflict over human rights' (Sachs, 2003 p.15).

The global scenario depicted by Sachs (2003) is thus Galtung's scenario of conflict transformation (Galtung, 1996), as the process which seeks to achieve the wider social and political sources of a conflict and to build change. For dealing with such conflict a further step, beyond negotiation, would concern personal, cultural and structural changes (Gandhi, 1928; Pontara, 1965; Knight, 1998; L'Abate, 1990). For example, when involved in conflict, the parties may defend positions which have a different level of 'perceived' importance, such as commercial interests which are weighed against primary needs. Besides, the parties involved quite often do not have the same level of power. For such reasons, for a conflict to be satisfactorily dealt with it is important that a distinction is made between basic needs, interests and values, and those groups of people which are in minority and try to put themselves in a condition of power equivalence. Nonviolent techniques for resistance often involve the creation of 'circles of solidarity' (Sharoni 1997), through which the 'offended' group can attract the interest and support from other groups. When power equivalence is established, the parties can themselves become the decision-makers, and the process of dealing with conflict can acquire educational and transformational power:

'Taking personal responsibility for negotiation rather than assigning the process to arbitrators or adjudicators offers an increased opportunity for personal growth by exposing parties to the views of the other, and provides the opportunity for deep self - reflection' (Weber, 2001 p.507).

In this sense, Bush and Folger (1994) described Gandhi's nonviolent approach to conflict as far more complex than 'problem solving' methods, which predominate in western conflict resolution styles. Nonviolence is a process-oriented approach, which does not focus on achieving a measurable solution, but to foster an environment that allows 'empowerment' and 'recognition'. In the view taken by Fisher and Ury (1981) the perceived lack of satisfactory alternatives or substitutes may lead the parties to perceive issues more rigidly than reality dictates, they can freeze themselves into

'positions' and a negotiator may be required to keep the parties engaged. Conflict transcendence can in principle be achieved in the long-term, through a series of intermediate steps through which the parties can bring themselves to a desired scenario for the future. This latter will be the goal of the conflict resolution activity with students to be described here. The results will be presented in the main study in Chapter 6 and will be organised according to the different outcomes of the dialogue process.

2.6 Activities in the classroom: games, simulations and role-plays

In the previous sections I dealt with the significance of taking on role, and how this process is central to communication and action in the everyday life. In education, role-play is associated with a particular category of learning tools, which have been around since the early 1960s and have been used in a variety of settings. Their application however has always had some degree of ambiguity. Since the beginning of their use, these techniques were shown to be generally successful in generating real involvement in the participants (Tansey and Unwin, 1969). Boocock (1963) reported an influence on behaviour: *'Games certainly induce motivation - and in particular some students, who usually act as 'trouble-makers' during the lessons, would become effective leaders in the game'* (Boocock, 1963 p.8). For this element of involvement and participation, games and simulation started to be associated with some radical, child-centred approaches to teaching and learning. For example: *'children have been too long taught things that are 'known' and have too seldom been allowed to discover for themselves the principles governing a situation'* (Coleman, quoted by Taylor and Walford, 1972 p.27).

In the past twenty years, games and simulations have been used in almost any discipline, but they have not always been accepted with the same enthusiasm by classroom practitioners (Cherrington and Van Ments, 1996). Some authors have argued for the potential of such tools to balance teacher-centred approaches and individual learning with face-to-face interaction and cooperative, peer-learning (Cherian and Mau, 2003), and there is also a great deal of literature which describes specific gaming activities (Ellington, 2000). However, teachers have been concerned about the practicalities of using such activities in the classroom (for example the time required), and how to assess the outcomes of such activities (Robinson, 1992). Equally, the

literature on simulation and gaming is broad and disarticulated and with little standardization (Barreteau, 2003), an excess of emphasis on instrumentality (Klabbers, 2001), and very little consensus as to how activities of role-playing can be designed. It is a task for this work to link theory with practice and empirical results.

2.6.3 Simulation exercises: definitions and opportunities for learning

Ellington (2000) typically refers to a basic classification '*by function*', which distinguishes amongst three main exercises: simulations, games and case-studies.

The central feature of a simulation according to the generally accepted definition given by Guetzkow (1963, quoted by Ellington, 2000) is that of being: '*an operating representation of central features of reality*' (p.14). Thus to qualify as a 'simulation' an exercise must represent a real situation of some sort (or imaginary that might be real), and must be ongoing, i.e. dynamic. In simulations, reality may be to some extent distorted, as some elements may be made simpler, partial or be pulled out of context. Some simulations deal with events set in a place in the past, or they could represent events invisible to human beings, for example events occurring on a bigger time-scale. Similarly, simulations can be used to represent subjects that involve some form of mutual interaction between multiple forces or actors, and under conditions where the outcomes are uncertain. For example, simulations are often based on social interaction, where players are involved in making decisions and communicating, or negotiating with one another. In this case players are expected to react to the situation in a way that will be determined by how they and other participants see their relative positions, motivation and attitudes or how they see their role within the system (Jones, 1980). Using the words of Tansey and Unwin (1969):

'Simulation lets us look at ourselves: it lets us do it much more objectively than ever we could in the real life situation when there is the compulsive need to justify our action against the criticism of our associates' (1969, p.12).

Games, as defined by Adams (1973) may be distinguished from simulations as '*having an end, a payoff and there are explicit game rules to follow in order to reach the payoff*' (Adams, p. 3). A characteristic of games is that they tend to have winners and losers. The players play against each other or some impersonal force, such as nature for

example, and they usually adopt competitive styles of playing, although not always at the expenses of cooperation.

Finally, much less structured, is the case-study: ‘an in-depth examination of a real life or simulated situation carried out to illustrate special and/or general characteristics’ (Ellington, 2000). Conventional legal or medical case studies fall into this category. In some instances, case-studies used to represent the complexity of multiple perspectives and decision-making in society, would share features with role-play. As will be shown in the following paragraphs, role-playing techniques show a great degree of versatility and variability. The focus is on understanding the behaviours and viewpoints of other players in role (Klabbers, 2000), while shunning from the ambition to make predictions (Green, 2002; Shubik, 1975):

‘they can question their motives and personal efforts, the rules and /or the resources, to develop strategies for the maintenance or transformation of the social system’ (Klabbers, 2000, p.388).

The two words *maintenance* or *transformation* mentioned by Klabbers are very important in the study described here, where role-play is introduced to study a situation of conflict which people seek to both understand and change.

2.6.4 Validity

In social research, role-play has also been the object of a relentless argument about the validity of such techniques for generating sound research knowledge (Cohen and Manion, 1980). Criticism addressed to role-play refers to it as being ‘unreal’, in that the subjects report what they would do and that is taken as though they did do it; it is reckoned that even with the more active forms of role-playing, participants’ behaviour can be too often susceptible to artefactual influence, such as social desirability (Ginsburg, 1978). In response, the justifications for using role-playing are grounded in an epistemology that consider the subjects of the research as ‘persons’, for intention, choice and self-presentation constitute the main focus of social activity among human actors. In this context, the validity of the research inquiry is linked to its capability to include such fundamental human capacities. For educational purposes, and for this particular work, such justifications have great relevance. As opposed to the normal

activity of playing, which can be quite ‘free’, in the sense of loosely defined and fairly unstructured, simulation, role-plays and games are usually designed for specific purposes and are heavily theory-laden. Beyond the goal of generating identification with, or just a feeling of sympathy for a character, this study was grounded in role-play as a means for elicitation of discourses and experiences (e.g. perception of risk, experience of danger and oppression, discourses of emancipation etc...), which are part of human existence and can be tapped into by means of knowledge, experience and empathy. This is adopted as a fundamental condition for validating a naturalistic mode of inquiry (Guba and Lincoln, 1982) and requires consideration of a number of aspects, from the design of the role-play, to handling the relationships amongst the participants (including the teacher and researchers). The literature on role-play has thus been reviewed for this purpose, to identify practical situations which could be interpreted in the light of relevant theory, as explained below.

2.6.5 Role-play: types and functions

Following the distinction suggested by Van Ments (1983), role-plays are found in various types and categories, their use changing from simple techniques for improving a specific performance, to tools and frameworks for developing understanding and change of feelings and attitudes. Particularly relevant to this work is the second characterisation, in which the role-play is more concerned with describing a problem, than offering a solution. The framework for interaction is less tightly constrained in order to allow more room for personal involvement, and active use of the players’ own experiences. Taylor and Walford (1972) isolate three key aspects in the process:

1. players take on roles which are representative of the real world and then make decisions in response to their assessment of the setting in which they find themselves;
2. they experience simulated consequences which relate to their decisions and their general performance;
3. they ‘monitor’ the results of their ‘actions’, and are brought to reflect upon the relationship between their own decisions and the resultant consequences.

In this context, the game conditions protect the players from any actual penalty, enabling them to enact critical incidents and to explore what happened, as well as

considering what might have happened if different choices had been made. Van Ments (1999) listed a series of functions that different role-plays may be designed to fulfil. This can be used as a guideline for balancing the skills and the attitudes on which the particular role-play used in this work seeks to focus on:

- enacting a situation by means of dramatisation. This category of role-play is very close to, and overlaps with, improvised 'street theatre', 'educational drama' and also dramatisation of legal cases;
- generating emotional involvement in order to increase awareness or sensitivity to a situation;
- promoting self-expression. In this kind of role-play at the beginning of the session, students are generally given an overall objective rather than detailed instructions on how to handle the situation, and so they proceed by developing self-awareness and observation.

2.6.6 Practicalities of role-play

Depending on the degree to which players are accustomed to the idea of role-playing, the conditions of the learning environment (e.g. the role of the teacher), and on the particular setting and organisation of the activity, the learning outcomes of a role-play activity can be very different. The warming-up period is particularly important to effective performance. Strategies that allow students to come together to gather ideas and discuss (sketching the characters, work in groups) can be effective to begin to get players involved.

The topic can be presented as an unsolved controversy, to which they are expected to make a contribution by clarifying interests and views. This can be effective in showing students that the problem is genuinely open and important, so they can see the relevance of their actions. As reported by Solomon (1993) some role-plays are hell-bent on trying to make players learn some pre-defined topics. An example of this kind of situations is the role-play 'Minerals in Buenafortuna':

'the agenda was already set by the authors. The students were asked to act out particular roles in order to appreciate hard decisions made by others'
(Solomon, 1993 p.58).

In these situations, players may feel deceived and manipulated and negative feelings of rejection and boredom will undermine learning. The literature on role-play gives some indication of what may need consideration when devising a role-play, and more detail is given as follows:

- Sketching the characters

Moore (1995) emphasizes a pre-performance brainstorming as an essential feature of the process, suggesting that initially students *'free write a practice paragraph about the topic from the point of view of the character, try to assume his or her voice and imagine their character being asked to speak about the subject, writing down what he or she would say'* (p.194). After this initial process, the sketch can be reviewed for accuracy and stereotypes. If students are working in groups they can discuss the sketch, and give suggestions to the role-player on how to improve the character's argument. Drawing on the work of Moore (1995) and McCaughan and Scott (1978), Mitchell (2000) remarks that *'in the ensuing character-sculpturing process it not only became clear that each character type possessed a unique perspective on the argument, but that within character types, differing viewpoints emerged as well'* (p.138). When a learning climate that affords trust and the possibility of receiving feed-back is established, students may then experiment with taking on roles with which they do not immediately closely identify or alternatively, trying with reversing roles, which can be useful for gaining understanding of opposed points of views (McCaughan and Scott, 1978).

- Use of role-cards

In cases in which students have little familiarity with activities of role-playing or with the particular topic of the controversy, or even in conditions of limited time, prepared role-cards may be provided by the organisers. The role-cards will give some information about the character (e.g. age, gender, origin, job...) and his/her particular point of view about the controversy. Some role-plays make use of cards that report excerpts of the speech that the role-player is supposed to perform, but more often the card is used only to provide the starting point for the discussion, letting the students free to make up their arguments on the basis of the information they have received (Ødegaard, 2003). In some cases, the role-cards may contain two or three questions,

from which students can construct answers, before the main presentation begins (Duveen and Solomon, 1994).

- Playing individual roles

In a role-play, each player may be allocated one specific role to play. This is the modality adopted in role-plays involving people from different cultures (e.g. Camino & Calcagno, 1995), or which may be set in exotic contexts, in which the multiplicity of and difference between roles can be used to enhance players' understanding of themselves in relation to the 'others'. However in classrooms with a large number of students, this requires having a great number of roles, with the risk of a fragmentary discussion. One of the possible solutions is dividing students into two or three groups of opinions, each asked to prepare a coordinated presentation, drawing on the evidence and interests held by the different characters. Examples of role-plays organised in this modality had groups of opinions of 8 to 10 members, playing different roles that shared some common interests: the results showed that while playing in bigger groups enhanced students' involvement (e.g. promoting the sense of team performance), the success of the role-play activity in this format was strongly dependent on students' previous abilities of working cooperatively, in order to prevent the exclusion or disengagement of some.

- Playing collective roles

Involvement is crucial in role-playing. However, it would not be surprising to see students withdrawing from the task: as remarked by Mitchell (2000), arguments and rhetorical performances, are potentially risk-taking activities, which some students could perceive as unattractive. To minimise this risk, Duveen and Solomon (1994) for example suggest allowing students to gather into small 'friendship groups'. In this format, each small group volunteers one of its members to carry the group's ideas to the larger class, whilst the other students of the group act as 'alter egos' of their performing colleague, watching the drama from afar and privately offer feedback, when required. This type of setting can be useful for avoiding dyadic confrontation between groups holding contrasting opinions (Moore, 1995) and it is also a way to give everyone a chance to be involved in the simulation. To this end, taking on role would be closely linked to the level of cooperation, exchanges and positive interdependency

which take place within the group (Johnson and Johnson, 1989). Also in this modality there can be, however, missing aspects, and for example the lack of opportunities for reflecting on one's role, which may be greater if students are not accustomed to using personal reflection in school.

- Use of dramatic strategies

Smooth performance and involvement in role-plays are rooted in a deliberate use of dramatic forms and conventions (Collier, 2000). Some such devices would encourage participants to identify and relate closely to the role-play process, and others would detach participants from the role-play experience and stress the artificial, representational elements of the drama form. Strategies of context-building for example (sound-tracking, costuming) can develop the dramatic situation and give a sense of reality/credibility to the role-play. Narrative actions (telephone/radio conversations, interviews, and interrogations) can focus on the story line and drive the role-play along. Again with little-practiced players, excessive realism can be frightening, as they can be prematurely 'plunged' into the new situation (Bolton and Heathcote, 1999). An effective procedure to deliver new information in role-plays and keep an element of dramatic surprise and unexpectedness, is that of 'information disclosure' (Ødegaard, 2003). In role-plays with cards it is possible for participants to know things of which others are unaware, for example secrets or simply information inaccessible to others, but in contrast to drama, such information may or not be disclosed, depending on the ability of the role-player to do so. When this happens the tension of the play rises to lead the play's climax to a turning point (Ødegaard, 2003).

- The role of the teacher

During the course of the simulation the teacher may be confronted with multiple and quite often unusual tasks. In case students found themselves drawn into hesitations and doubt, the teacher should be mindful of his/her attitudes, trying not to be too intrusive, and *'everyone's speech drying up into an atmosphere of embarrassed silence'* (Solomon, 1991, p.32). At this point it is quite extraordinary the variety of possible strategies suggested by practitioners in the field to help the teacher interact with the students in role. Equally extraordinary is also the tentativeness in which such suggestions are made, and the lack of substantial research in this field which would

help to connect theory and practice. Mitchell (2000) warns teachers about being too keen on trying to control the flow of dialogue, and interfering with students' talk, as this would give the students the feeling of not being genuinely responsible for their task. Van Ments (1983) suggested that the teacher can practice the delicate task of widening the spectrum of the arguments with the introduction of subtle plot twists. Again, this may be seen as a way to interfere with students' performance. Collier (2000) keeps on emphasising that role-play is a dramatised form of interaction. In this context the teacher can adopt dramatic strategies to act within the simulation, for example by providing students with a 'news update' or an 'urgent memo'. This can help students to revise their statements or re-think their roles. In case of role-plays dealing with a controversial issue, players may have difficulties in reaching a decision (Green, 2002). In this case, the teacher, if conscious of limited time and concerned about keeping control of the learning outcomes (Holman, 1986), may be tempted to offer his/her interpretations, defeating the original problem-solving purposes of the activity. In such cases a specific agenda and rules can be devised and given to the students to follow and to bring the game to a closure. Teacher's interventions can also occur on a broader level, where changes of pedagogical venue, can enhance students' predisposition to the activity. For instance *'changing the physical location of the class or taping the sessions can add realism and reinforce the nature of the role-play exercise'* (van Der Muelen Rodgers, cited in Mitchell, 2000).

2.6.7 Simulated public arguments in science education

Socio-environmental issues such as that of prawn farming that is dealt with in this thesis are characterised for being open-ended and urgent problems, about which different groups of people have different and often contrasting opinions. With the purpose of investigating the conditions for conflict resolution, Crenshaw (1995) and Mitchell (2000) maintain that perspective-taking in role-playing can be used to create a *simulated public argument* leading to the exploration of the many layers and perspectives embedded in public arguments, and which are too often obscured by 'yes–no' debating formats. This kind of real-life decision-making situations was first introduced in science education as part of the teaching of Science and Technology in Society (SATIS), to develop students' awareness of the different value systems upon which choices are made (Holman, 1986; Solomon, 1991).

Following those initial works, two main types of role-plays can be identified:

- a. Role-plays as *enactments of a present or historical socio-scientific controversy* (Duveen and Solomon, 1994; Ødegaard, 2003) are based on personal or collective stories, and are aimed at giving the players insights into the socio-scientific structures of society.
- b. Role-plays as *simulations of public-decision-making processes* (Camino and Calcagno, 1995; Simmoneaux, 2001) are inspired by a real situation, or designed as justifiably realistic, in which students take on the role of representatives of several societal groups and engage with the resolution of a public argument involving science and technological issues. The decision may be that of a community vote in favour or against the issue at stake, or a unilateral judgement issued by a commission of designated people in charge.

(a) An example of the first group of role-plays is the '*Great Evolution Trial*' (Duveen and Solomon, 1994) in which students enact the famous 'Oxford Debate' on the concept of Darwin's view of evolution. Although much of what historically happened – the facts – is known, the role-play is not used for a simple re-run of an historical event. The activity was set out as a presentation and discussion of points of view, with no script to follow, so that: '*the outcome depends only on the battle of ideas developed by the students themselves. Also it would allow us to introduce the voices of ordinary people, and any others we considered important into the debate*' (Duveen and Solomon, 1994). For example, some characters were realistically designed to hold religious views of several kinds as well as Lamarckian interpretations of evolution, and also the idea that evolution was linked to progress through the *struggle for survival* was introduced, where students would find an echo of their own views. Far from being a simple activity of free fantasy, Honey (cited in Solomon *et al.* 1992), argued that role-play can be used to develop scientific and historical understanding through creativity.

Similarly Ødegaard (2003) adopted a role-play technique to introduce an ethical perspective into the teaching of biotechnology, including the expertise of the learners as well as their life-experiences and worldviews. Students were involved in the enactment of a realistic but hypothetical situation of a family, involved in the dilemma

of deciding over prenatal genetic testing. The role-play was tried out with 18-19 years old students and there was no fixed narrative offered, with the dialogue being only partly structured by means of role-cards. This allowed for direction, discussion and type of arguments to be distinctly determined by the students. The author pointed out that the discussion often focused on the evaluation of the consequences of action, thus touching upon consequentialist ethics. However the students also showed a considerable amount of empathy for each other in role, and for the unborn baby, which was fundamental for the development of an ethics of caring. This role-play made use of the dramatic device of 'information disclosure', which increased students' involvement. In the study it was observed that after the disclosure, the focus of the discussions changed from the 'duty to tell or not to tell', to 'the right to know or not to know', in relation to the decision to genetically test the foetus. These empirical findings recall issues of conflict and human rights in the work of Sachs on socio-environmental conflicts, casting light on the power of science to interfere with life and the severe limitedness of the consensus of science in the generated controversies. Ødegaard (2003) effectively remarked that the perspective of rights in conflict pushed students towards the search for more scientific information about cures, medicines and so forth, which quite often however was not sufficient for making a decision. Students appeared to follow other routes, such as imagining the situation in the future, and quite often this led to a change of opinions.

(b) Worldviews clashes and decision-making processes are at the core of a group of role-plays devised by Camino and Calcagno (1995). These are centred upon socio-environmental issues, which are urgent problems found in the local environment. As the authors describe it, *'the role-play deals with current and unresolved problems that society has to confront, at first at the local level (this being easier to document and probably having a higher degree of involvement) but also at the global level so as to frame the problem in a necessarily wider scenario'* (p.63). Like the role-plays previously described, these aimed to present a more contextualised view of science, as problematic and value-laden activity, but emphasis in these role-plays is put on people's awareness: *'to present the environment not just as a 'given', but as a social construct, in the sense that it is constructed through social beliefs and actions and it is perceived through the prevailing socio-cultural framework'* (Hodson, 1992, quoted by Camino and Calcagno 1995, p.62). Examples of these are the role plays on reforestation techniques in India, water management and soil protection in Burkina

Faso, but also the clashes between the inhabitants of an Italian city and groups of immigrants. In these role-plays there is a strong element of simulation: the role-cards and scenario are carefully outlined to allow students to enact a character in a foreign setting. Camino & Calcagno (1995) described the role-play exercise as a simulation of a public debate in which two worldviews confronted each other. The activity was set out to run in 4 stages (ideally these would correspond to 4 meetings of 2 hours each). In the initial briefing period students were introduced to the geographical scenario of the controversy (using also videos, photos and slides), and they were given a summary of the main facts of the controversy. After the initial presentation, students were invited to discuss in pairs their general opinions about the issue. A second phase consisted of students taking on role to present and discuss their points of view with a group of peers. Two (sometimes three) groups of about 10 members were formed to represent characters holding contrasting opinions about the problem, while another group represented a commission of decision-makers. This group usually constituted 4 - 6 students, selected by the teacher from the more mature students. All groups received a selection of information documents (web-pages, journal articles, fact sheets) about the issue and took part in the simulation of a public debate. The role-play ended with the declaration of a verdict, followed by a debriefing session in which students were invited to reflect upon the cost and benefit of the proposed solutions and to consider alternative ways for action.

Findings from research carried out on the use of this kind of role-plays with 16-18 years old showed that, with sufficient guidance and suitable materials, students displayed responsibility for their task and for the information collected, as well as empathy with the role. Students moved from a description to a conceptualisation of the situation (Taylor, 1988), and they appreciated the possibility of seeing the problem from different perspectives (Colucci, 1998). In line with Heron's observations on holistic education (1992), through the use of perspective-taking students can learn to make relevant distinctions, picking out what was salient, to service the pursuit of the needs and preferences of their characters and they can learn to reflect upon their characters to recognise conflicting worldviews. In the context of geography education, Livingstone (1999) argued that these kinds of role-play realistically reproduce the nature of the decision-making processes in Western democracies:

'Students need to empathise with the views and values associated with the role they are playing, and have to recognise that each of the roles does not hold equal power over the decision or equal resources, particularly of information or expertise' (Livingstone, 1999 p.64).

In this case, the win/lose setting was realistic and successful in generating commitment and keeping the momentum of the discussion. However, Camino and Calcagno (1995) also reported that students would have difficulties with taking on roles and they might not be able to see the disadvantages of a verdict solution. Similar results were obtained by Simmoneaux (2001), who observed that students would resort to the simple strategy of voting in order to settle the controversy. In other studies conducted on the use of role-plays on socio-environmental issues (Colucci, 1998), students believed that a better solution might have been achieved if more time was given, or more scientific data were available to resolve the problem. As Simmoneuax (2001) pointed out, role-plays should perhaps explore whether possibilities of 'consensus' or a 'higher common principle' on which to build a compromise, may emerge between protagonists with seemingly opposing points of view. In this context, it is possible to note that current literature in science education has not yet dealt with the topic of conflict. Indeed, authors that looked at the process of dialogue between different perspectives have also indicated the epistemological and political challenges that such a process would bring. For example, Freire (1972) and more recently Giroux (1992; 1997) talked about dialogue as a 'subversive activity'. Through dialogue people are supposed to create new understandings which are 'explicitly critical' of current socio-political structures and are aimed at action.

Recent research conducted with adults in the workplace indicated role-play as a means for developing a 'double vision', or the ability to hold many points of view in suspension, which is required for handling conflict (Bohm and Peat, 1987). In the course of role-play activities, players engage with an exercise of respectable discussion (Butler, 1995; Innes and Booher 1999), during which they shift their attention towards the methodological aspects: *'outcomes were usually found in the form of intangible products, such as growth in their sophistication about each other, about the issues and about the futures they could seek'* (Innes and Booher, 1999).

Bohm (1997) also give some practical tips for implementing dialogue. An important condition is that participants must view each other as colleagues or peers, for dialogue is essentially a conversation between equals. In addition, in the early stages of dialogue they suggest having a facilitator who 'holds the context' of dialogue. The role of facilitators should be to occasionally point out situations that might present sticking points for the group. In other words, their role should be that of aiding the process of orientation, but these interventions should never be manipulative or obtrusive.

This kind of literature is useful here to give an indication of the nature of the learning process which is offered to the role-players and to inform the evaluation of the activity, as will be reported in Chapter 3 and 7. However in the case of adults, role-play sessions may need to run over an extended period of time, as consensus is often only reached after a number of continuous sessions of cooperative group work. This may be an important difference to bear in mind when working with adolescents and a reflection on time and competences will form an important part of the findings of the empirical work.

In sum, role-play was described as part of an interrelated set of learning and teaching methodologies, such as games, simulations and dramatisations, each one with specific characteristics. For the purpose of studying the use of role-play in the classroom, it may be useful to summarise the main points covered in the literature according to a set of features. In the table that follows (Table 2-B) role-play is presented as a dramatic enactment, in which the players are participants in a real, human story. By participating in the enactment and taking on role, and/or watching it from afar, they can observe themselves and others - reflect and achieve an understanding of the situation 'from within'. By means of simulation, the players can learn about the rules in specific settings and how people behave, but they can also appreciate the symbolic aspect of the activity, and use imagination and creativity to think about how things could be different, or how they might be changed for the better. Through drama and role-plays they gain an understanding of the values and the norms of groups in particular contexts. This is an important aspect in this research, given its concern for students' engagement with values and the resolution of conflicts in a global scenario.

Table 2-B Learning opportunities in role-play

A role-play includes features of:	Characteristics	Constraints	Opportunities for role-play
Games	There is a set of rules and turns	Most often, interaction is shaped by a competitive strategy with winners and losers. This dichotomy may cause people to feel in a dilemma or even a conflict about what is right or wrong	Shifting from payoff... ... to cooperative outcomes
Simulations	Players play from a particular perspective and interact with one another	Interaction is shaped by a rationale, which includes principles and models of how a particular system works	Understanding multiple perspectives and different solutions
Drama	Drawing on imagination and personal experience, players can add different nuances to their roles, by means of empathy and creativity	Enactment is confined to performance of one role at a time. Risk of being trapped in the role, or within a stereotyped performance of one's role (little creativity)	Learning how to act in given situations. Reinvent oneself in other roles

2.7 Research questions

So far in this chapter, I have described the conceptual and practical basis of role-playing. By taking the perspective of social interactionism, playing a role was presented as a spontaneous activity for people in society. Role-playing was described as a mechanism through which people formulate expectations for other people's behaviours, interpret meaning and signs, and prepare themselves to act accordingly. In Goffman's account of role-play, performance of a role in society was described as engagement with others in a group, which leads to exchange and assimilation of information relevant to the role, and the building of consensus. Working in teams was then presented as closely linked to a process of identity formation, and value acquisition.

Language was a central dimension in the process. In the field of rhetoric, a connection was identified between presenting oneself in role, and expressing a point of view. The performance of a role was defined as a purposeful action, with the power to affect the point of view of others and later actions. In the model, communication and interaction

with others in role would involve the role-players at all levels: cognitive, social and emotional.

At this point, a tension emerged between roles as boundaries, within which we develop our own subjective perceptions, and the ability, associated with role-playing, of stepping into someone else's shoes, and feeling empathy (Plotkin, 2002). One of the problems which were explored in the literature was the notion of conflict and consensus, and the need to unmask power structures and value-assumptions, which prevent deep communication. To this end, the theory of non-violence was introduced to describe conditions for dialogue, which are based on empathy and power equivalence. By such means, a situation of conflict could be turned into an opportunity for social and cultural change.

The final part of the literature review dealt with the use of role-play in the classroom. It was emphasised that an educational activity could be devised to sensitise students to different values and roles in society, to get them to engage with the expression of a point of view, decision-making and conflict. For the purpose of the research, it appeared important to carry out an analysis of language and communication of people in groups, in order to ascertain students' ability to build consensus, use empathy, and activate personal knowledge to imagine themselves in other contexts.

A series of research questions guided the research process:

- 1) What are the most significant features of students' discussions?
- 2) Do students feel angry after the simulation of the Court of Inquiry?
- 3) How far do students use empathy to engage with the search for consensus and deal with conflict?
- 4) Do students use scientific knowledge to understand the issue?
- 5) How much do students remember three weeks after the activity was conducted?

An evaluation of the outcomes of the activity was then to be conducted in relation to a series of *propositions* which related to the meta-learning features of role-play, and can be taken as the guiding objectives of this investigation:

- i That role-play can be used for introducing students to the complexity of current socio-environmental issues, where different groups of people have different opinions, based on their values and interests, and perceptions of the environment.
- ii That role-playing can involve students in an active way, and stimulate them to use their imagination and creativity to make sense of the issue from the character's point of view.
- iii That perspective-taking in role-playing would help the students to see the problems from different points of view, to feel emotionally involved and to reflect on the ethics of different courses of action.
- iv That the cooperative learning environment would encourage students to talk through ideas and to unravel the complexities of the issue and that they would activate both scholastic knowledge and personal (private) knowledge in formulating their propositions.
- v That learning can be related to understanding and action: by putting forward the different points of view, words can affect others' viewpoints and later actions.
- vi That appropriate role-playing methods allow students to be sensitised to a change of attitude, actively deal with conflict and gain durable learning from the experience.

Drawing upon the educational features of role-play, the next chapter will deal with the study of the methods.

3. Methodology and Methods

3.1 Introduction

In the previous chapter, I explored the philosophical, pedagogical and practical aspects involved in students' learning about socio-environmental issues through role-playing. Building on the theoretical insights, this chapter describes in further detail the research methods, from the construction and revising of the role-play activity, to the relevant data collection and analysis.

3.2 The topic and context of the role-play

Historically, prawn farming had never constituted an 'issue'. It was part of the traditional sets of dwelling practices in Southern Asia, and was often used as a complement to agriculture. In modern times, when fish stocks in the sea were officially declared as declining, prawn farming was proposed as a solution for humanity's food needs. From the introduction of high energy based 'food revolutions' (such as the Green revolution in agriculture, and the Blue revolution in aquaculture), there had been an increase in food production, but this had not always been accessible to those in need. In addition, with the environmental problems associated with intensive farming the living conditions of the poor had worsened, because of the impossibility for these people to gain access to resources other than those immediately available in their local environment (Gadgil and Guha, 1995).

In 1997, the actions of the local villagers organised in the nonviolent movement led first to a formal hearing before the Indian Supreme Court (Rigby, 1997). The Court recognised issues of environmental degradation and human rights and declared the banning and dismantling of all prawn farming industries which were less than 500 metres from the coast. However a series of appeals and counter-appeals followed, in which contradictory evidence was produced by different agencies: since 1998, when the verdict was emanated, prawn farming installations flourished throughout Asia and South America, along with the spreading of environmental and social problems (Lawrence, 2003; Sorum and L'Abée-Lund, 2002).

Over time, intensive prawn farming has become one of the fastest growing businesses throughout the world, and the issues surrounding it have attracted the attention of the media, experts in agricultural and food sciences and citizens alike. The activity produces social and environmental impacts at all levels in the global network of food production and consumption, both on the people (e.g. potential consumers of prawns as well as local people) and ecosystems. Further complicating the understanding of such impacts are interconnections with other issues such as deforestation, salt in the soil, migrations of people from the periphery of India to larger cities, and what to use as the basis to compare the risks and benefits involved. For example, all farming impacts on the environment, including organic farming. Large-scale commerce of supposedly organic products contributes to the global problem of carbon dioxide in the atmosphere, and it is both energy and money intensive. Moving away from intensive farming, and a switch to small-scale, organic and fair trade markets, may not yield sufficient incomes to cover production costs.

The complexity of the socio-ecological environment in which the conflict arose was examined by Naylor *et al.* (1998 and 2000) through a mapping of the interconnections between sites of production and consumption of prawns, natural environments and the different stakeholders. The authors made use of causal relationships of a circular form, such as feed-backs, to describe the conditions in which the impacts caused by the prawn industries were reinforced or compensated by other phenomena in the natural environment. For example, in the local ecosystems of Southern India, the mangroves have a complex ecological role through which they provide a 'nursery' environment for many species of birds and fish, including prawns, and they protect the inner land from the sea. The felling of the mangrove trees to free up surface for the construction of prawn farming triggered a positive feed-back, where the reduction of the mangrove barriers led to increasingly low levels of biodiversity and availability of wild stock, which is, ultimately, the source of raw feed for the farms. Circular and recursive processes in environmental systems are responsible for networks of mutual influences and interactions between living and nonliving things, in a dynamic exchange of matter, energy and flows of information. The complexity of such interactions may require the acknowledgement of issues of uncertainty and ignorance in our knowledge of ecological systems (Harremoes *et al* 2004).

While this is far from an exhaustive list of the issues in this debate, it makes it clear that the prawn farming controversy offers a substantive context for exploring science-related decision-making at both the local and the global context.

3.3 Aims and design of the study

As it was anticipated in the first chapter, previous Italian versions of this role-play (Colucci and Camino, 2000) were tried and tested in a variety of contexts. The role-play was originally used to introduce students to the local and global dimensions of socio-environmental issues and to understand the complexity of the web of interrelations between food production and consumption and the social and environmental impacts (e.g. on community life and nature's resources and services). The topic also fits well with general science topics in secondary schools: food chains and food webs, the interdependence of organisms within ecosystems, human environmental impacts and the role of science and technology in supporting human development, with the associated ethical issues. The implicit assumption which guided the interventions was that by taking on roles and engaging in discussion, students would be able to see the issue from different points of view, build awareness of different models of development and different relationships between human communities and the environment. They would also begin to engage in a process of reflexivity, to revisit their values and see themselves as part of the issue. However, as observed during the course of the simulation, students encountered difficulties with dealing with the issue: one aspect in this was pedagogical, and related to exploring more critically the role-play strategy and how it worked. Another aspect related to students' dissatisfaction with the trade-off strategy, which suggested the need for finding alternative means for dealing with a complex issue and build consensus.

Given this, the aim of this study was that of deepening understanding of the learning process associated with a role-play simulation and reconnecting the specific support action to a broader theoretical framework of learning through role-playing. With this in mind, the focus of the new investigation became that of understanding the conditions for role-playing in the classroom. One aspect was developing practical knowledge about role-play; another was trying to build a better theoretical understanding of this methodology in relation to students' learning about socio-environmental issues.

Two main purposes guided the research. One was as an evaluative tool to inform the development of a role-play activity, in which data were gathered to monitor students' engagement and participation in the role-play. The other was a reflective tool, concerned with understanding role-play as a process of change, looking at the perceptions of the students involved, how they felt about the activity and whether it provided a focus for reflecting upon themselves and their learning.

In line with these two purposes, the research was organised as an empirical investigation in a natural context, in which something could be learnt about the methods, the process and the context. This required including a certain element of openness in the research protocols, and the ability to incorporate new insights and understanding as these were gained in the course of the investigation, working accordingly to what is more appropriately defined as an emerging methodology. In line with this understanding, methodological assumptions were regularly revisited during the course of the study, including the role of the researcher and the strategies of inquiry, enabling towards the end of the thesis an appraisal of the methods (Chapter 7) which will not only reflect on the limitations of the study but also - in more general terms - consider the meaning of a pedagogy for teaching socio-environmental issues.

To start, an activity of role-play was devised with the objective of creating a context for participation, discussion and engagement with decision-making processes. The activity involved groups of secondary school students, aged 13-14 years old, and was refined following a pilot study (described in section 3.4) in which students' reactions to the activity were examined. A main investigation was then conducted with another class of students of the same age group, section 3.5. As will be further explained in section 3.5, the changes were modest, with the basic structure of the project remaining the same. However, the main study drew upon previous reflection to look more in depth at the role-playing features. In the final discussion (in Chapter 7), results from both runs are pooled into a general reflection on the experience, to inform new propositions and further developments.

All planning and running of classroom interventions was carried out in partnership with the teachers and my main supervisor, Prof. Joan Solomon³. Together, we presented the activity in the classrooms and exchanged mutual perceptions about the events which took place. Given my lack of experience of the English school context, this partnership

approach proved useful in making prior assessment decisions on the methods, accessing schools and teachers and contributing to assess issues of internal validity (as explained later). I will start here with a description of the role-play methods.

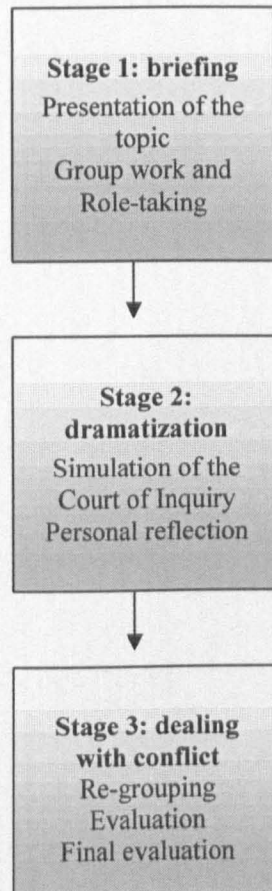
3.3.1 Three-stage structure

As mentioned, the focus of this study was the exploration of knowledge construction and learning through role-playing. One fundamental condition was that participants were enabled to take on a role, to engage in discussion and deal with conflict, by means of empathy. Necessarily, the research was inextricably linked to the design and structure of the specific tasks and objectives, and much was learnt from the literature on role-play and consensus processes. The central feature of the design was constituted by the possibility to play in different settings. If the assumption is that one group has to ‘win’, the dramatised picture will highlight competition, internal consensus and empathy for one’s own character. On the contrary, if the role-play is used to build awareness of personal assumptions and develop abilities to listen to other peoples’ points of view, an activity of conflict resolution can be designed to reflect on impacts, in the light of possible errors.

In practical terms, the activity was designed in three different stages, in which students engaged in a variety of tasks, from information seeking and discussion in groups, to presenting in role, and dealing with conflict, as described below (Figure 3-1).

³ In the course of the research and in the data analysis she will be referred to as the ‘senior researcher’,

Figure 3-1 Three-stage role-play



Stage 1: Briefing.

The early part of the work was planned as a process of familiarisation with the rules, the topic, context and characters of the role-play.

- *Presentation of the controversial topic and the rules of the role-play*

This initial part of the activity was designed to set the scene for the role-play: the researchers/facilitators are introduced to the students, and the purpose and rules of the activity are explained. The topic of the controversy was also introduced and presented to the students, by highlighting the fact that it was a real issue, still open and unsolved. Students were made aware of the global dimension of the issue, and the need for wider discussion between people around this topic.

- *Scenario and slide presentation*

This second element had the purpose of introducing the students to the simulated context of the prawn farming controversy. Because of the exotic setting of Southern India, some photographic material was used to present the Indian coastal environment with the mangrove trees, the prawn farming installations and the type of farmed prawns, the degradation of the soil and the people involved in the controversy. The slides had been collected from people and friends who had been in India and had visited the prawn farming and the researcher presented them with a short, descriptive commentary (Appendix 13). The slide presentation was the important moment in which participants were introduced to a scenario which would otherwise be only imagined. An element of reality was thus injected, with the purpose of giving students some contextual information which they could then use to enact their characters' presentation.

- *Group work: preparing for role-playing*

Group work was introduced in the first part of the activity as a means to facilitate and catalyze role-playing. Because of the difficulty that students may have in taking on an unfamiliar role and expressing themselves in that role in a convincing manner, it was felt that group work would encourage students to discuss their role, and that such discussion would help them to assimilate the relevant information and acquire competence with the part. To this end, students were divided into friendship groups of three, and each group was given a single role-card, which contained information about the character's social and cultural background, age, typical behaviour and attitude towards prawn farming. Each group had the specific remit of discussing the role-cards, finding additional information and producing a persuasive argument. In addition, a group of about four students would constitute a commission of adjudicators. Hence, the students appointed to be adjudicators would be part of a group, but each one was given an individual role. Their character was summarised briefly in a role-card containing a set of questions, designed to guide them through their task of questioning and listening to the characters in the course of the discussion. A blank matrix with the names of the characters was also prepared for the adjudicators to note some specific questions for the characters, as well as other items which could aid the adjudication process.

Stage 2: dramatisation

- *Simulation of the Court of Inquiry*

The first role-enactment was designed to take place in the context of the simulated setting of a Court of Inquiry. The classroom was reorganised for the adjudicators to sit at a table at one end of the room with the other groups facing them. For each group, a nominated spokesperson was given the task of presenting in role in front of the adjudicators and respond to questions. The rules of the activity were such that no discussion was allowed to develop between the witnesses and the adjudicators, and the adjudicators needed to ensure that the groups answered questions in the appropriate manner. At the end of the simulation, the adjudicators were given a few minutes for a short consultation prior to the formulation of the verdict, and the researcher was involved in the task with them. In this final task, the researcher played a supportive role, to ensure that the adjudicators carefully evaluated each piece of evidence and came up with a clear-cut decision. As part of the rules of the role-play, the adjudication was supposed to reproduce the context of the Supreme Court of India (mentioned in section 3.2), in which a decision was to be made either in favour or against prawn farming, without the possibility to compromise.

- *Personal reflection*

After the adjudication and the declaration of the verdict, an activity of individual reflection was planned to gather students' feelings about being in role during the simulation. An open-ended question was given here to encourage students to write down how they felt in their character, during the discussion and after the adjudication. The analysis of such feelings was important to reveal both negative and positive emotions, particularly the feeling of empathy.

At this point in time, students in role would have engaged with only one decision-making setting. In line with the indications of the literature and previous experiences of role-plays, a rough estimate of time for Stage 1 and 2 was about an hour. Another hour was then allocated for stage 3.

Stage 3: Dealing with conflict

This part of the activity was also designed as a group work activity. At this point, students in role were re-organised to form larger groups, with different roles being represented. Individual players therefore stayed in role but now encountered opposing points of view. For this task, the students who played the role of adjudicators were allocated to one of these larger groups. This exercise was expected to be demanding of students' abilities, requiring them to communicate with other people in their roles, and to practice listening to other people's voices and points of views, in order to achieve some resolution for the conflict. Students were briefed about the aims and the process of conflict resolution, with the aid of a diagram (displayed in Chapter 6) showing different situations and outcomes of dialogue in conflict. Students in each group were asked to work together to produce schemes or posters, which they could use as an aid for discussion, and for presenting the outcome of their discussion to the other groups, in the course of a plenary session at the end.

- *Evaluation*

In the final part of the activity, students were asked to express their thoughts about the role-play simulation exercise. A questionnaire was provided to capture students' immediate reactions to the activity, and further evaluative comments were gathered three weeks after the activity, by means of a questionnaire, administered by the teacher.

3.3.2 The role of the teacher and researchers

The role-play activity was designed so that teacher and the researchers would be mainly in charge of the organizational aspects of the activity (including the research equipment), and they did not express their views about the controversy. By playing the roles of the host and organizers, teacher and researchers were responsible for the introductory parts of the activity, at the beginning of each session. A selection of overheads and slides was prepared for the teacher as a support material for running the introduction, and these materials can be found in Appendix 2 and 3. An additional set of overheads was prepared for Stage 3 on conflict resolution. Two diagrams were used for explaining the process of dealing with conflict. The first diagram (in Appendix 7) was used to describe conflict in the initial conditions, pointing to two irreconcilable positions. The second diagram was

used to illustrate different approaches to conflict and the path towards transformation, and can be found in Chapter 6.

3.3.3 Role-play materials

In order to support students to work in groups, to gain some understanding of the foreign context and to encourage students to get into character, additional materials were prepared. As mentioned earlier, a selection of role-cards and information sheets was given to the students during the role-play to facilitate their comprehension of the multidisciplinary aspects of the controversy and to work together in groups to discuss and assimilate the information. The different kinds of supporting materials are described as follows.

The characters and the role-cards

As a common characteristic, each role-card would contain some biographical information and examples of life-experiences, to which the players could refer for their enactment, and a simple and deliberate language was used (Van Ments, 1999). In fact, just as in theatrical performances, the role-play was designed to allow students to make their own interpretations, and it was the students' task to draw on the characters' profiles and to interpret their points of views. In this case, because the activity had an educational purpose, the objective of the research and the observation of students' engagement was to look at the kinds of images, knowledge and experiences that students would bring with them and express in the course of the dramatization; this would constitute material for further reflection on the learning process (the analysis of students' interpretations of their parts is detailed later in this chapter for the pilot study, and in Chapter 4 for the main study).

In the original (Italian) version of the role-play, role-cards were prepared to represent a great variety of actors, each one with a stake in the controversy. In order to play the game and give voice to such a variety of stakeholders, students were required to play individual roles. In this study, the change in the role-play methods required the characters and the role-cards to be re-designed accordingly. First of all, with the grouping of students in small groups, the number of characters was reduced considerably. It was thus important to decide who of the many possible characters

should be selected, and to define their views and personal histories, so that students would have a meaningful range of characters to play in the course of the simulation. Additionally, the text of the original role-cards was shortened and the language simplified to suit an audience of secondary school students. Some of the original Indian names were replaced with more English-friendly names; care was taken to replace scientific jargon or any other unusual term with words of more accessible meaning.

In this study, the full cast of characters consisted of 8 witnesses and 4 adjudicators. 2 additional adjudicators' roles were prepared and kept as spare cards. The list of the characters is presented in Table 3:

Table 3-A List of characters

Generally in favor of prawn farming	Generally against of prawn farming	Commission of adjudicators
Sonja Rey (Minister for the Development of India) Shailesh (Indian landowner) Dr. Krishna (Doctor) Paul Power (American entrepreneur)	Tami Sunethra (representing the movement for the land) Margherita Broecarts (Ecologist) Jeganatthan (leader of the nonviolent movement) Dharwar (head villager)	Robert Brown (Minister for Indian Agriculture) Priscilla Singh (Representative from FAO) Dr. Goshivah (doctor) Marco Dandri (Italian NGO's volunteer) Anita Randrapradesh (medical researcher) Satish Rampal (ministry for Indian education)

As Table 3 shows, characters ranged from local Indian villagers, local landowners, as well as representatives of the Indian Government and International organizations, professionals and foreign entrepreneurs. The profiles of the characters were selected to provide different perspectives on the same issue. For example, Paul Power would represent the foreign entrepreneur, looking at India as an expanding market for business, and for prawn farming in particular. Dr. Krishna would present the concerns of an educated Indian professional, and would look at prawn farming as an opportunity to tackle the problem of malnutrition. In contrast, Jeganatthan would represent the ‘other face’ of the Indian population, namely the majority of Indian people, who live in rural areas. Jeganatthan would then describe his efforts for the redistribution of the land to the poor to increase the self-sufficiency of the families in rural villages. Finally, the adjudicators have a position of responsibility: they can be ministers, doctors or activists

and they have the task of studying the issue and finding out more about it from interviewing the characters and evaluating the evidence. The adjudicators have a shorter card-descriptor indicating the adjudicator’s nationality, their particular concerns about the issue and an indication of possible questions that they may use to think about the problem.

The information and worksheet materials

Role-cards and other materials used in the course of the activity were appropriately modified as a result of the pilot trials. Two examples of the role-cards used in the pilot study (a witness and an adjudicator) are given in the box below, while the full set of role-cards used in the main study is reported in the Appendix 6. For each study, the full list of role-play materials included:

- 4 + 4 role-cards;
- 4 role-cards for the adjudicators + worksheets;
- selection of slides on the Indian local environment and the mangrove swamps;
- 4 information-sheets;
- 1 diagram about the conflict resolution process and some other additional material.

Figure 3-2 Two examples of role-cards used in the pilot study

<p><i>Example of a witness' role-card (supporting prawn farming)</i></p> <p>SONJA REY - Minister for the Development of India</p> <p>I have devoted my life to the development of India. For a long time I was a civil servant in the Indian Central Government trying to improve living conditions for the people. This can only be done if we establish successful trade with the developed countries, which will bring in foreign currency.</p> <p>Fortunately our coastal climate is just right for prawn farming and India has the second highest production of prawns in the whole world. People from rich Western countries are very keen on eating 'Prawn cocktails' so we can export all we can produce. We are also making prawn-feed for other Asian countries with prawn farms</p> <p>It is essential to encourage this kind of industry and tackle any problems that arise.</p>	<p><i>Example of an adjudicator's role-card</i></p> <p>Dr. GOSHIVAH</p> <p>I was asked by the local government of Tamil Nadu to participate in this decision- making meeting. For many years I have been concerned with local health problems such as water shortages, and epidemics of disease. I am anxious to know if prawn farming will improve health in the region.</p>
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3.3.4 Data collection and analysis

The unit of observation and analysis in this study was the learning experience of the students. For this purpose, both the collection and analysis of the data were aimed at capturing the context and complexity of such learning, to produce a rich picture of the role-play events.

Data were collected at different stages in the course of the activity in order to answer the research questions, and a variety of methods was used. An overview of the stages of the activity with the relevant data collection is presented in Table 3-B. The different columns refer to the stages and activities, the datasets and the focus of the observation. As presented in the Table, data were collected from group activities by means of recordings of students' discussions. A convenient strategy was giving a tape-recorder to each group of students, to put the tape recorder on and off as they felt it appropriate. Taping group discussions was important for understanding how students gathered information about their characters, discussed and understood it, and how they used language to express themselves in role. In order to integrate the knowledge gained from the observation of groups' performances, additional data were gathered from each individual student, by means of questionnaires (as mentioned earlier), which were distributed to the students at different points in the course of the activity. Semi-open ended questions were used to prompt students' comments on the process of being involved in the role-play, and in more detail:

Questionnaire 1 was administered after the adjudication in order to capture students' feelings in their roles. Gaining evidence of students' emotional involvement was important here to ascertain if students managed to participate effectively and if they got into character by means of empathy.

Questionnaire 2 was administered after the activity on conflict resolution in order to seek out students' perceptions of the task, and whether they had developed some new insights into the controversy and the possibility to approach it.

Questionnaire 3 was aimed at gathering students' feedback on the activity to understand the nature of their learning. Question items were designed as 'triggers' such as '*I learnt that...*' and '*I learnt to...*', to tap into students' learning at different levels. For example, one level was that of factual

knowledge; another level was that of the meaning-making and attitude development in the course of interaction with other people in roles (these could either be the characters in the controversy as well as their peers, participating in the interaction). Because this final questionnaire was designed to gather information about learning, it was felt that such information would be more valuable if gathered some time later, three weeks after the experience.

As an additional source of data, a video-camera was used to capture information about the contextual elements e.g. the setting of the activity and the atmosphere in the classroom, which could be accessed if needed (for example to cross-check notes and memories of the order of the events). For this reason, the use of the video-camera was not emphasised, but it was sufficient for this to be placed at one corner in the class at the beginning of the activity, and left. An additional audio-recording was made to tape the general discussion during the simulation of the Court of Inquiry.

Field-notes were also taken with the purpose of recording the contextual elements (e.g. layout of the classrooms, information about relevant dates and places), and to record my perceptions and reactions to the events, which could be checked at a later stage to disclose skewed perceptions and assumptions. Therefore, field-notes referred to descriptions of the school and classroom environments, discussions with the senior researcher and the teacher, and my personal observations of the role-play activity.

Table 3-B Overview of data collected throughout the role-play activity

Stages	Data collected	Focus of the observation
Stage 1	Video-recording plus 9 audio recordings. Groups' written notes	<u>How far students can manage group discussion and build consensus:</u> <ul style="list-style-type: none">- agreement and disagreement;- use of voting or other negotiation strategies;- emotional involvement.
		<u>Features of talk which give indication about how far students take on a role:</u> <ul style="list-style-type: none">- use of the first pronoun;- selection of relevant arguments and justifications to express the point of view of the character;- creativity and emotional involvement in interpreting the part.
Stage 2	Video recordings plus audio-recording Adjudicators' written notes	<u>Presenting one's role:</u> <ul style="list-style-type: none">- consistency with the character's stakes and knowledge;- creativity in the use of information and interpretation of the part;- ability to engage the audience's interest, to use language appropriately and to respond to question.
	Students' free-writings (questionnaire 1, part A and part B, individual activity)	<u>Indicators of emotional involvement</u> <ul style="list-style-type: none">- e.g. anger, responsibility, achievement, frustration, empathy with one's role.
Stage 3	1 video-recording plus 4 audio-recording. Groups' posters	<u>Level of consensus</u> <ul style="list-style-type: none">- finding common ground;- establishing agreements;- moving away from personal expectations;- ability to listen to other people in role, to take into account the needs and the points of view of others.- framing one's needs within a wider scenario of multiple interests. <u>Creativity</u> <ul style="list-style-type: none">- in proposing solutions;- finding alternatives. <u>Attitudes</u> <ul style="list-style-type: none">- trust towards others;- confidence and assertiveness;- active listening.
	Semi open ended questionnaire (quest. 2)	<u>How far students felt they have achieved something about the conflict</u> <ul style="list-style-type: none">- indicators of emotional relief, responsibility, commitment to take action.
	Semi open-ended questionnaire (quest. 3)	<u>Students' memory of and learning from the activity</u> <ul style="list-style-type: none">- types of students' learning: e.g. about the specific issue, about the process of working in groups, about the relevance and opportunity to engage in discussion of an important theme.

In this research, the collection of data from multiple sources was intended to provide a rich picture of the role-play, by focusing on understanding the students' whole learning experience. Research in this case was dependent upon the interaction between the methods and the specific sample. Methods for data analysis were revisited in the course of the study, as the quality of the data changed and new perspectives on the data and the process under observation could be considered.

In order to understand how far students in groups approached role-playing, a template for analysis of the recordings was produced to gather evidence of group discussions and role-playing by means of a category-based, semi-quantitative approach. The template was derived following Sprod's concept of epistemic episodes (Sprod, 1997); it was validated in the course of the pilot study and then further developed during the study, as a means for conversation analysis. In section 3.5.3 I will explain how a method for analysis of talk-in interaction (Mercer, 2000) was progressively developed and applied in the main study investigations which followed.

The analysis of the questionnaires was aimed at identifying themes, which were used in conjunction with the results obtained through the analysis of the transcripts.

3.4 The pilot study

As reported in previous sections, the study was planned to take place as a teaching intervention during which groups of secondary school students would be involved in a role-play activity. The nature of the research had an impact on decisions about sampling and methods. In particular, access to target participants was inevitably indirect, and required to be negotiated. The target participants for the role-play were secondary school students, who would do the role-play as part of their science lesson. Following the classification of Maxwell (2005), this research progressed through a semi-structured approach, in which some aspects of the research were specified *a priori*, building on theory and previous experience of the researchers, but these needed to be understood through reflection and further revisions of the methods.

The pilot study enabled the observation of students’ reactions to the role-play. In line with the suggestion of Schofield (1993) and Stake (1995), attention was focused on trying to maximise what could be learnt from the activity, in both theoretical and practical terms. Two teachers, both known to the senior researcher, were approached for a pilot investigation in two different schools. It was no deliberate intention to have schools from different socio-economical background, but it was preferable to have students with some general literacy skills. For the selection of the samples, we asked the teachers to suggest classes to us. It was important that the activity was offered to teachers as a reasonable request, by declaring and sharing the objectives of the research, as well as showing professional understanding and flexibility. In the first instance, we needed to make sure that the length of the activity would not interfere with the rest of the school activities and that the teachers were happy to introduce the role-play lesson as part of their teaching. The overall timing of the activity was provisionally estimated as two hours and agreed by the teacher. This included introduction, running of the role-play and closure, with no opportunity to contact the students afterwards for follow-up, because this would have made further demands on the teachers’ time. Given the interdisciplinary nature of the topic we felt that older students would have had stronger basis in many of the subject areas and this could help them in their discussions. However, it proved impossible to recruit older students as the teachers felt that the activity would have interfered with their preparation for the final exams. The sample used for the pilot studies consisted of two classrooms of year 10, from two different comprehensive schools in Oxfordshire (Table 3-C).

Table 3-C The classroom samples for the pilot study in England

School	N. of students involved	Age	Teacher	Quid pro quo
School 1	24	13-14 years old	Biology teacher	<ul style="list-style-type: none"> - the activity fits in with the National Curriculum requirements. - Good opportunity to tackle global issues. - Concerns for the likely students' reactions to unfamiliar names of people and places (e.g. Indian names), which may be distracting.
School 2	15	13-14 years old	Physics teacher	<ul style="list-style-type: none"> - Some students in the class were defined as borderline disaffected. - The teacher felt that the activity could involve students and positively challenge them.

The activity appealed to the teachers because of its links with the syllabus specifications for year 10 (age 13-14), on food matters and healthy eating, food chains and citizenship, along with topics such as social justice and sustainability. The teachers expressed willingness to get involved in the role-play and to use a couple of hours of their teaching to host the activity. Some preliminary information material, describing the topic, the outline of the activity and some of the teaching devices that they could use for introducing the activity was sent to them for background reading. In preparation to group work, we asked the teachers to prepare a list of students' names and photographs, with some suggestions on how to best arrange students in friendship groups.

3.4.1 Organisation of the activity

In both classrooms, the teachers gave an introduction with the rules of the activity and a description of the controversy using prepared materials, shown in Appendix 3. The researchers shared responsibility with the teacher over the research equipment and they offered help and advice to the groups when required, along with the teacher. Other specific aspects related to the organisation of the activity were discussed with the teacher prior to the simulation and these are summarised as follows:

- The use of dramatic strategies (e.g. use of costumes, sampling and sharing of traditional Indian food, display of typical objects) was ruled out by the school from the beginning. The teacher in School 1 warned us about students' reactions to unfamiliar names in the role-play materials; the school's regulations would not allow students to eat any food in the science laboratories and pointed to a very limited time available for setting up the activity in-between lessons.
- The activity was scheduled in a way that would fit into the existing timetables, which implied having two role-play sessions in two non-consecutive days. This made it impractical to organise a preliminary lecture on the topic of prawn farming.
- We relied on the help of the teacher for organising students in groups, and making sure that students would feel at ease with their peers. This procedure resulted in the groups that would normally sit next to each other in the classroom. Because the teacher in school 1 worried about problems of discipline in all-boy groups, girls (whom

he saw as more mature and better disciplined) were distributed amongst the various groups to make for mixed-gender groups.

3.4.2 Visiting the classrooms: teacher and students

Prior to the study, I visited both classrooms in the course of a normal science lesson, to familiarise myself with the layout of the school and gain a feel for the English classroom environment. Some similarities and differences characterised the two samples. In school 1, the teacher remarked that the class was generally ‘good’ in many academic subjects. In School 2, the teacher described students as a lively classroom. This included some disadvantaged students (some of whom had been classified as ‘borderline disaffected’), but the teacher was enthusiastic about the relationship she established with the students. She gave some examples of activities, such as quizzes, to explore questions of general interest in physics⁴ which, she said, encouraged students to offer their own answers and ideas. Table 3-D provides a summary of preliminary observations which shaped the course of the study.

Table 3-D Researcher’s observations of the two classrooms prior to the role-play

	School 1	School 2
Teacher’s comments on the class	good class of well performing students	lively class, average performing students, some individuals from disadvantaged families
Students’ activity at the time of the preliminary observations	microscopic observations in the science laboratory	teacher’s lecture on electricity integrated with little experiments
Layout of the class	students in school 1 were working in groups of three around large square tables; the teacher would walk round the tables to give explanations and instructions	tables were stuck together against the teacher’s main table, other table were orthogonal to the blackboard and one student, was sitting alone at the far end of the class
Classroom climate	they would occasionally ask me for help (!), but in general they worked accordingly to an established routine	teacher adopted a playful mode of interaction with the students, and the impression they conveyed was that of a long-standing agreement between them ⁵
Suitability of the labs for role-play use	the science laboratories have mobile tables and chairs and a plug-point for each table. There is a	same as School 1

⁴ Examples provided by the teacher were questions such as ‘how many stars are in the sky’ and she made a point of telling us about the difficulty of building students’ self-confidence and understanding of their own answers. Too often they would strive to provide the teacher’s answer/opinion and the ‘right’ answer.
⁵ Even the boy at the back of the class would pick up on the teacher’s cues and participated in interaction. To my surprise, at the end of the lesson the students were expecting the teacher to launch a flying plastic pig, hanging from the ceiling, to give an entertaining example of ‘the circular motion of a hanging object’!

	blackboard, an overhead projector and a storage cabinet available for use	
General observations:	Good location for the role-play. Traditional mode of teaching: the teacher is the main ‘voice’ that students would follow	Good location of the role-play. The teacher is the main voice, and makes use of teacher-centered approaches to engage students

My preliminary observations of the two classrooms were very brief and insufficient to make any informed judgment about the classrooms or the teachers. Given that students seemed to enjoy discussion and exploration, role-play could well prove successful. However, I had also been informed by the teachers that neither class had been involved in role-play in science before. The pilot study was the opportunity to begin to test the conditions for role-playing.

3.4.3 Running the role-play in school 1 and confronting the drama of School 2

In both schools, the activity took place in June 2002, towards the end of the school calendar. On the first day scheduled for the role-play in School 2, the teacher warned us about some unexpected events, which affected the course of the investigations. A policy emanated against ‘bunking off’ school was put into operation and disaffected children had been forced to go back to school by their parents, even though they had not been in the class for the whole year. Normal teaching routines had been severely disrupted, and this could have impacts on the role-play. On the first day of the activity, students found it very hard to get involved: they were distracted, had difficulties reading their cards and concentrating on the task, and in some cases, they refused to do the activity. In response, materials were simplified where possible, with the intention of trying the role-play exercise again on the second day. There was no time to make changes on the role-cards but the texts of the questionnaires were modified from open-ended questions to ‘tick box’ formats. Table 3-5 provides an overview of the event in the two schools. The texts of the questionnaires for School 1 and School 2 are reported in Appendices 9-12.

Table 3-E Overview of the role-play events in the pilot study

Stages of the activity	Materials	Role of teacher and researchers	Role of the students
Stage 1 and 2			
Introduction Scenario Rules of the role-play <i>Estimated Time: 30'</i>	<ul style="list-style-type: none">• overheads• slides• overheads	<ul style="list-style-type: none">• teacher and researcher took the roles of conductors/organizer	<ul style="list-style-type: none">• to gather information, observe, take notes
Group work <i>Estimated Time: 10'</i>	<ul style="list-style-type: none">• 8 role-cards + 4 cards for the adjudicators• 4 spread-sheets• video camera• 1 tape-recorder for each group	<ul style="list-style-type: none">• teacher takes on role and acts as facilitator• the researchers are in charge of the equipment	<ul style="list-style-type: none">• students are divided in groups of three members• 4 students form the group of the adjudicators• they read the materials and prepare themselves for the simulated debate
Simulation of the Court of Inquiry <i>Estimated Time: 10'</i>	<ul style="list-style-type: none">• tape-recorders and video-camera• adjudicators' worksheet	<ul style="list-style-type: none">• the teacher sits with the adjudicators and chairs the debate	<ul style="list-style-type: none">• the characters present their views• the adjudicators ask questions and take notes
Adjudication <i>Estimated Time: 10'</i>	<ul style="list-style-type: none">• tape-recorders and video-camera	<ul style="list-style-type: none">• teacher provides information for the second part of the activity	<ul style="list-style-type: none">• listen to the adjudicators' decision
Reflection after the decision <i>Estimated Time: 5'</i>	<ul style="list-style-type: none">• questionnaire 1: 'how did you feel?'	<ul style="list-style-type: none">• observers	<ul style="list-style-type: none">• individual writing

Stage 3 – ONLY SCHOOL 1

Conflict Resolution <i>Estimated Time: 10'</i>	<ul style="list-style-type: none">• overheads	<ul style="list-style-type: none">• researcher explains the theory of conflict	<ul style="list-style-type: none">• listen
Group work <i>Estimated Time: 10'</i>	<ul style="list-style-type: none">• overheads	<ul style="list-style-type: none">• observers	<ul style="list-style-type: none">• students are divided in groups of 5-6 students + 1 adjudicator• collect ideas, discuss
Group presentations and evaluation <i>Estimated Time: 15'</i>	<ul style="list-style-type: none">• questionnaire 2: 'there is something I wanted to say...'	<ul style="list-style-type: none">• observers and facilitators	<ul style="list-style-type: none">• groups' presentations.• individual writing

For both Schools:

AFTER THREE WEEKS: Evaluation	<ul style="list-style-type: none">• Questionnaire 3: after thoughts	<ul style="list-style-type: none">• The teacher is responsible for administering the questionnaires	<ul style="list-style-type: none">• Students report individually what they remember about the activity
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In both Schools, the activity took place in the science laboratories. By giving advance warning to the teachers, we were able to access the classrooms to arrange the table for group work and set up the equipment. Each group was given a tape previously labeled with the character's name and lesson number, and a tape-recorder, which the groups would use to record their talk. Students were left free to switch the tape-recorder on and off whenever they felt it appropriate, but they repeatedly interrupted the recording to rewind the tape and to listen to what their voice sounded like. In School 2, although

some students had recorded for longer periods of time, the tapes were often filled with long pauses of no talk. Table 3-F and 3-G display the data collected in the two Schools and the groups' arrangements.

Table 3-F Data collection in School 1

Stages	Groups	Name of the group	Duration (minutes)	Other data	Number of questionnaires collected
Stage 1	2 boys, 1 girl	Dharvar	12.5'		
	2 boys	Dr. Krishna	10'		
	2 boys, 1 girl	Jeganatthan	11'		
	2 boys, 1 girl	Margherita	7'		
	2 boys	Paul Power	6'		
	2 boys, 1 girl	Shailesh	11'		
	2 boys, 1 girl	Sonja	7'		
	2 boys, 1 girl	Tami	8'		
	2boys, 2 girls	Adjudicators	8'		
Stage 2	Total students 24	Debate Adjudication	15.7' 8'	Questionnaire 1	22 ⁶
Stage 3	5 boys, 1 girl	Power+Marco+Tami	12'	Questionnaire 2	21 ⁷
	3 boys, 3 girls	Margherita+Sonja+Priscilla	15' 12'		
	4 boys, 1 girl	Jeganatthan+ Shailesh+Robert	12'		
	4 boys, 2 girls	Dharwar+Krishna+Anita			
	total students 23				
Evaluation				Questionnaire 3	24

Table 3-G Data collection in School 2

Stages	Groups	Name of the group	Duration (minutes)	Other data	Number of questionnaires collected
Stages 1 and 2	2 boys, 1 girl	Dharvar	5'	Questionnaire 1	14
	2 boys, 1 girl	Dr. Krishna	6'		
	2 girls	Jeganatthan	7'		
	2 boys	Paul Power	5'		
	2 boys	Shailesh	6'		
	2 girls	Sonja	7'		
	2 boys	Tami	3'		
	2 boys, 1 girl	Adjudicators	1'		
	total students 19	Debate + Adjudication	10'		
Evaluation				Questionnaire 3	14 ⁸

⁶ 2 students were not in school on the second lesson
⁷ 1 student left the class just before the lesson ended

3.4.4 Analysis of students' discussions

The recordings of the lessons from both schools were fully transcribed by a secretary, proof-checked and analysed. The transcripts from School 1, with longer and better quality recording were subjected to a semi-quantitative analysis. In School 2 only the recordings from the second day were considered for transcriptions and analysed, although data from this school had limited value.

The first question of interest is whether students took on the role convincingly. The assumption was that role-taking would be supported by group work, with students working together to share information, and hence gaining the necessary confidence and skills to present themselves in role (as was outlined in Table 3-B). The main focus of the transcript analysis was therefore to describe how students worked in groups, at all stages in the course of the activity and gather evidence of role-playing. For the purpose of the pilot, the analysis related more broadly to the whole event, by gathering information about the nature of students' talk and how their discussion started and progressed. To this end, it proved useful to first divide the transcripts into continuous sequences of discrete episodes of talk, indicated as epistemic episodes. Following the description given by Sprod (1997), an epistemic episode would contain the talk evident during the course of a discussion. Distinct epistemic episodes would then be found through close reading of the transcripts to perceive changes, in which the discussion turns from pursuing the solution of a particular problem into another, by means of a '*palpable sense of switching*' (Sprod, 1997 p. 913). Epistemic episodes covered sections of talk in which students followed the allocated tasks, such as, for example, reading information and discussing the issue of prawn farming. However, there were also other types of talk, which were classified as 'off-task' events. These ranged from episodes of disengagement, to instances in which students were involved in managing and organising themselves in group and making sense of the task. Once they had been identified, each event was labelled and categorised e.g. the first section of talk was labelled as E1, followed by the interval on the tape-counter which described the duration of the event⁹. Examples of epistemic episodes are given as follows:

⁸ Some students in the Adjudicators group, Sonja and Dr. Krishna did not fill out the questionnaires.

⁹ The speed of the tape counter was measure as 5.1' and the length of the epistemic event was calculated by multiplication of the speed by the interval on the tape-counter.

- **Pooling information:** these are sections of talk which are concerned with activities of brainstorming, pooling and selection of information. They are usually identified by an interruption or a pause in the discussion and their analysis gives an indication of the time students spent reading as opposed to discussing and of the impact on their performance. For example:

School 1, Tami (E4, at about the 2nd minute in the transcript):

Boy 1: The people of the southern region of India lost ten thousand hectares of coastal land when the government sold it to industrial companies for the prawn farming.

Boy 2: The land can no longer be farmed on because it is all crusty and salty.

- **Summarising:** the students summarise the main points of their discussion or rehearse their presentations. These are often found at the end of the transcript, as in the following example:

School 1, Paul Power (E10, at the end of the transcript)

Boy 1: I don't know. Continues with the argument. People are dying, because of the lack of protein in their diet. Now, *we are good people* and we heard about this and we thought it was our place to do something about it. That is why we have brought prawn farming to India.

- **'Discussing' events:** the students discuss a number of topics related to prawn farming, by establishing links between issues and examples. A chain of interconnected events is usually formed:

School 1 Dr. Krishna (from E7 to E9, at about the 3rd minute in the transcript):

E7: they weigh up cost and benefits of prawn farming

Boy 1: hmmm, there is also a disease in the prawn farming industry so this may affect the children...

Girl: and then the drinking water

[...]

Girl: the water is going to be filthy so that is not good; no one is going to drink it

Boy 2: in the long run, in the long run, hmmm it probably doesn't provide more food because...

E8: They find out more about the problems encountered by intensive farms

Girl: Why are the pools used for a small amount of time?

[...]

Girl: Unless there is anything that actually likes the salt

[...]

E9: They think of possible alternatives to repair the damage

Girl: they could harvest the soil...

Each epistemic episode was further scrutinised for any specific information relating to features of talk considered important for the study. An additional series of categories was thus created, as a template in which evidence of specific aspects of students' talk could be gathered. Table 3-H displays the resulting template for analysis, which

comprised the dimension of the epistemic episodes, capturing the macroscopic aspects of students’ talk, arranged vertically, and the micro-features of discussion, ranging from topic, collaborative talk, role-play and so forth, shown on the horizontal line. The table also contains an example of the data analysis carried out using the template:

Table 3-H Category template for the analysis of the transcripts

Epistemic event number and duration ¹⁰	Group (labelled with the name of the character)	Topic	Collaborative talk	Epistemic operations	Role-play	Conflict and consensus
E2 rehearsal of the presentation	1. Boy 1: We are representing Tami Sunetra and this is what we have to say (...) OK, the prawn farmers are cutting down the mangrove trees around the coast, to run pipes from the sea to the big prawn farms.	The mangroves are cut down Installation of the farms with the pipes	Introducing	Predication	Role-taking	Eliciting consensus
	2. Boy 2: Yes, yes, yes 3. Girl: yes		Supporting		They all agree with the content of the card	Consensus

Each micro-feature was further conceptualised and defined in the course of the interrogation of the transcript, according to the nature and content of students’ discussions. In more detail:

- Topic:

This section contained the topics dealt with in the discussion. A topic ‘switch’ was often linked to a change in the type of epistemic event: for example when a new topic was introduced in the discussion, students would often feel the need to gather more information. In this case, the epistemic event would change from a discussion event into a reading/gathering information type of event. Similarly a change of epistemic event was informed by other micro features, such as collaborative moves, which are described below.

¹⁰ Duration is expressed by an interval on the tape-recorder. Each rotation of the tape in the machine transcriber roughly corresponded to 5.1 sec. The multiplication of the interval on the tape-counter by 5.1,

- Collaborative talk:

Specific collaborative moves were coded as shown in Table 3-I. Single moves often served a number of different functions. For example, collaborative moves which supported the previous speaker also extended the construction of meaning proposed, and even completed the sentence being spoken. In line with Bridges (1979) I had to take into account that the type and numbers of categories depended on the purpose of the discussion (i.e. achieving victory, completing a task, reaching consensus) and on participants' motives. For example, discussion during debate can progress to some extent via the expression of negative attitudes. This aspect was considered in the interpretation of other emergent features of talk, such as conflict and consensus, as presented later.

Table 3-I List of collaborative moves

Challenge	explicit or clearly implied rejection of the idea expressed in a preceding move: e.g. <i>'What?'</i>
Elaborating	supportive of the move that it is a response to, but adding new prepositional content to the discussion: e.g. <i>'exactly, so maybe he is slightly biased'</i> . Provides new evidence, summarises
Eliciting elaboration	attempt to elicit an elaborating move: e.g. <i>'what do you mean?'</i>
Eliciting consensus	set of arguments aimed at creating cohesiveness to the group's strategy and point of view: e.g. <i>'do you all agree with that?'</i>
Hedging	noncommittal response to a request or a challenge, or a softening of a statement, or a supportive move expressed with reservation: e.g. <i>'well, sort of...'</i>
Initiating	opens up the discussion by inviting contributions, asking for clarifications, focusing attention on the task: e.g. <i>'Miss, I don't have a clue'</i> . <i>'all right, we need to read this'</i> .
Integrating	reconcile two conflicting ideas within an exchange, or makes a link between two or more exchanges. A specialised form of elaborating move. e.g.: <i>'so the doctor is definitively for the prawns, but he does not seem to be aware that...'</i> Contains explanations, and makes use of analogies
Introducing	It may be used to open the discussion, introducing new specific ideational content. e.g. <i>'how about this...?'</i>
Managing the group work	suggests possible division of labour within the group. reminds about procedures, time etc.
Imposing and refusing	one member of the group charges other members of the group with a particular task or job. The decision is often not shared and the other person 'refuses' to go along with somebody else's decisions: e.g. <i>[speaking in front of the teacher] 'I'm sure C. can do it'</i> , and the reaction is: <i>'No I am not going to speak'</i>
Monitoring the equipment	makes it sure that the tape-recorder is working all right
Monitoring the task/discussion	expresses comments about the quality of the discussion, elicit new contributions, envisage challenges: e.g. <i>'we can't really mention that without going too far'</i>

divided by 60, gave me an indication of the total length of time of the transcript. Episodes were often only fractions of minutes and they were expressed in seconds.

	<i>away...'</i>
Query loop	set of closely related moves for clarifying or confirming a meaning or a decision, but not intended to elicit new information. Consists of an initiating query, a responding answer and an optional feed-back move: e.g. <i>'I think Dr. Krishna thinks this is a good idea but... I think Dr. Krishna obviously isn't aware... Yeah.'</i>
Retracting	speaker backs down on an idea previously expressed, often in the face of a challenge: e.g. <i>'all right then, what about...'</i> or <i>'maybe the prawns need the sea bed though..'</i> , or <i>'What if...'</i>
Supporting	expression of general approval of a preceding move, or a way of maintaining it as a topic of discussion. It can take the forms of repetition or paraphrase of all or part of a preceding utterance or expression of approval: e.g. <i>'that's right, yeah'</i> .

- Epistemic operations

In capturing students’ contributions to the discussion of the issue, I categorised a number of speech functions, related to students’ explanations, consideration of alternatives choices, and ability to participate in inquiry. Each utterance was labelled as an epistemic move to form a system of categories, such as that of Pontecorvo & Girardet (1993), but with the exclusion of the category *appeals to time*, as the students were discussing and role-playing a contemporary issue. Conversely a new category, ‘questioning’ (divided into open and closed questions, according to the division made by Barnes and Todd, 1977) was added, which indicated that students dealt with an ill-structured type of problem. In the open question approach, students asked each other hypothetical questions which would trigger more discussion or elaboration by others. In contrast, in the closed approach the question could elicit consensus and lead the group to settle on a shared view, plan or idea. At the macro-level this could also signal a switch into a different epistemic episode.

- Role-play

For the purpose of the pilot, analysis aimed at identifying the percentage of time students focused their discussion upon their role, as compared to other aspects of talk (such as reading information, discussing the problem, management etc.), for which three categories of students’ talk were identified:

Talk out of role: This category referred to the condition in which the talk is not in tune with the character’s type. The students are discussing the topic as themselves and use the third person: e.g. ‘Sonja is not aware...’

Role-taking: this category referred to the condition in which students' talk is in the 'first person', as they began to assume the identity of their character. Indicators of role-taking were considered in simple terms, such as the use of the first person, e.g. 'we are Dr. Krishna'.

Role-playing: the students talk in the 'first person' and make personal and creative use of the information, adding relevant arguments, justifications and examples.

An inter-rater reliability test was used to check the reliability of the category framework described above, as indicated by Sprod (1997). For the selection of the epistemic episodes, the percentage of agreement between two inter-raters amounted to 90%. From the discussion between the inter-raters, it emerged that most disagreement concerned the distinction between off-task and on-task events, and particularly in those sections of talk in which students were discussing the rules of the game or the procedures for working in groups. While in some cases these events were related to task management, in other cases it seemed that such events were advance warnings of students' disengagement. In line with Sprod's observations, the selection of the epistemic episodes was affected by context-dependency, and the characteristic type of discussion produced by each group. Additionally, it was very common to find that events would often slip into one another by very subtle movements, and pauses in conversation.

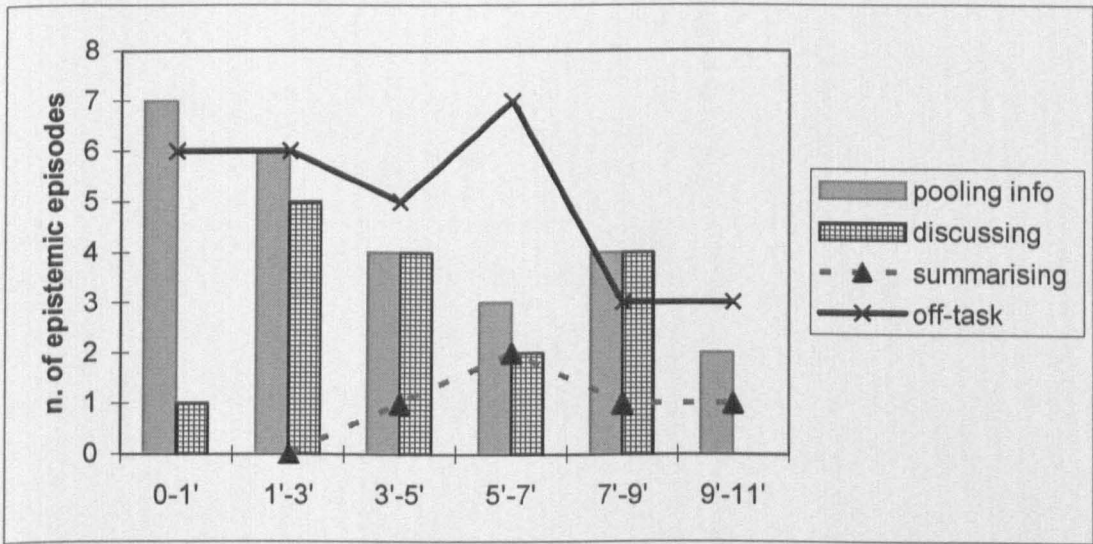
The percentage of agreement between inter-raters for the categories listed in table 3-I was about 70%. This, in conjunction with what has already been discussed about the validity of epistemic episodes was considered sufficient for making initial explorations in the pilot study, although it seemed clear that a refinement of the analytical framework would lead to a better understanding of students' discussions. Details of this are given later in this chapter, when introducing the design of the main study.

3.4.5 Results from School 1, Pilot Study

The analysis of the transcripts from the first part of the activity showed that students' discussions were organised around a number of different focuses, evidence of which was found in the different types of epistemic events, each one lasting for short periods of time, sometimes only fractions of a minute. Figure 3-3 shows that in the first minute

of recording, students' talk switched very frequently from one task to another: a total of 7 events were found across the recordings of all groups, in which students were pooling information, 6 events in which they were off-task and only 1 discussion event was counted. The number of discussion events increased over time, suggesting that after the initial delay, at about three minutes into the task students began discussion. The number of off-task events is high throughout the task, suggesting that discussion was hardly sustained for any length of time. At about the 7th minute, all groups had ended their discussion and had gone off-task. Only 1 group (Dr. Krishna) got back on task, and this was connected with the group beginning to look at their role and pooling information (this is shown in the last bar-chart in the Figure).

Figure 3-3 Activities performed by the groups at different time intervals



In the first part of the activity, prior to the adjudication, the analysis of the transcripts showed that:

- there is a delay in starting discussion,
- students were frequently off-task and discussion was not sustained for any period of time.

A more detailed analysis of discussion for each group shows some common features. The following chart – shown as Figure 3-4 below – gives the percentage of time that each group spent for the different discussion activities for Stage 1. The chart displays a number of different event types and different focuses. The bar-chart gives the time

allocation (expressed in percentages) for each event. This includes both the time used by the teacher to give instructions to the class and the off-task talk.

Figure 3-4 Percentages of groups' talk for Stage 1

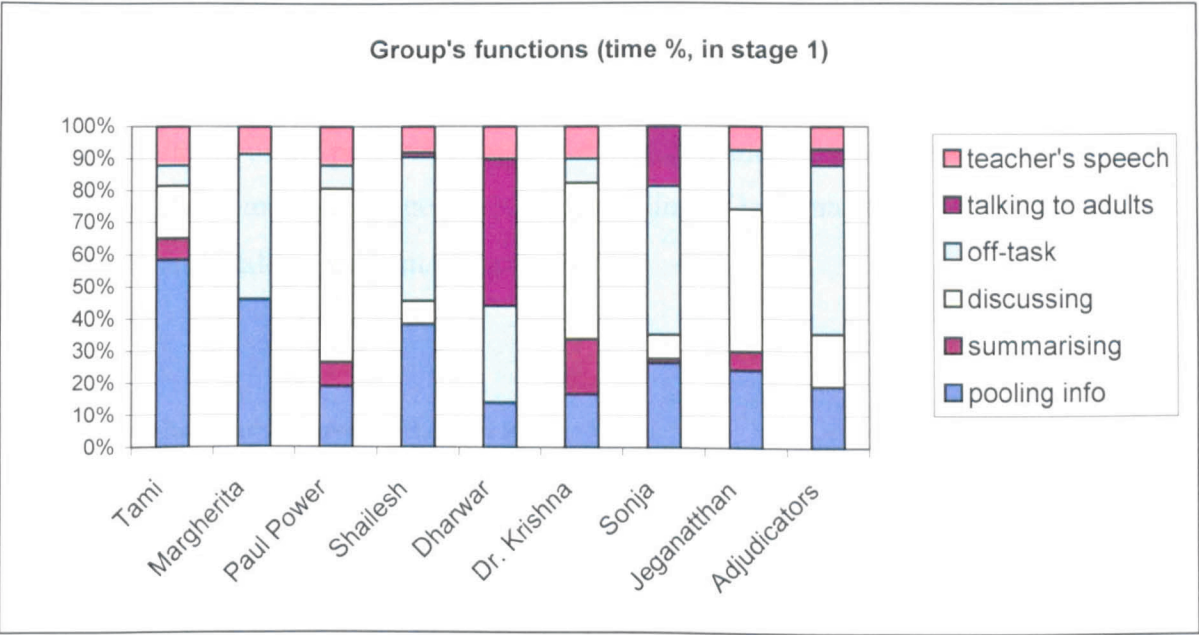


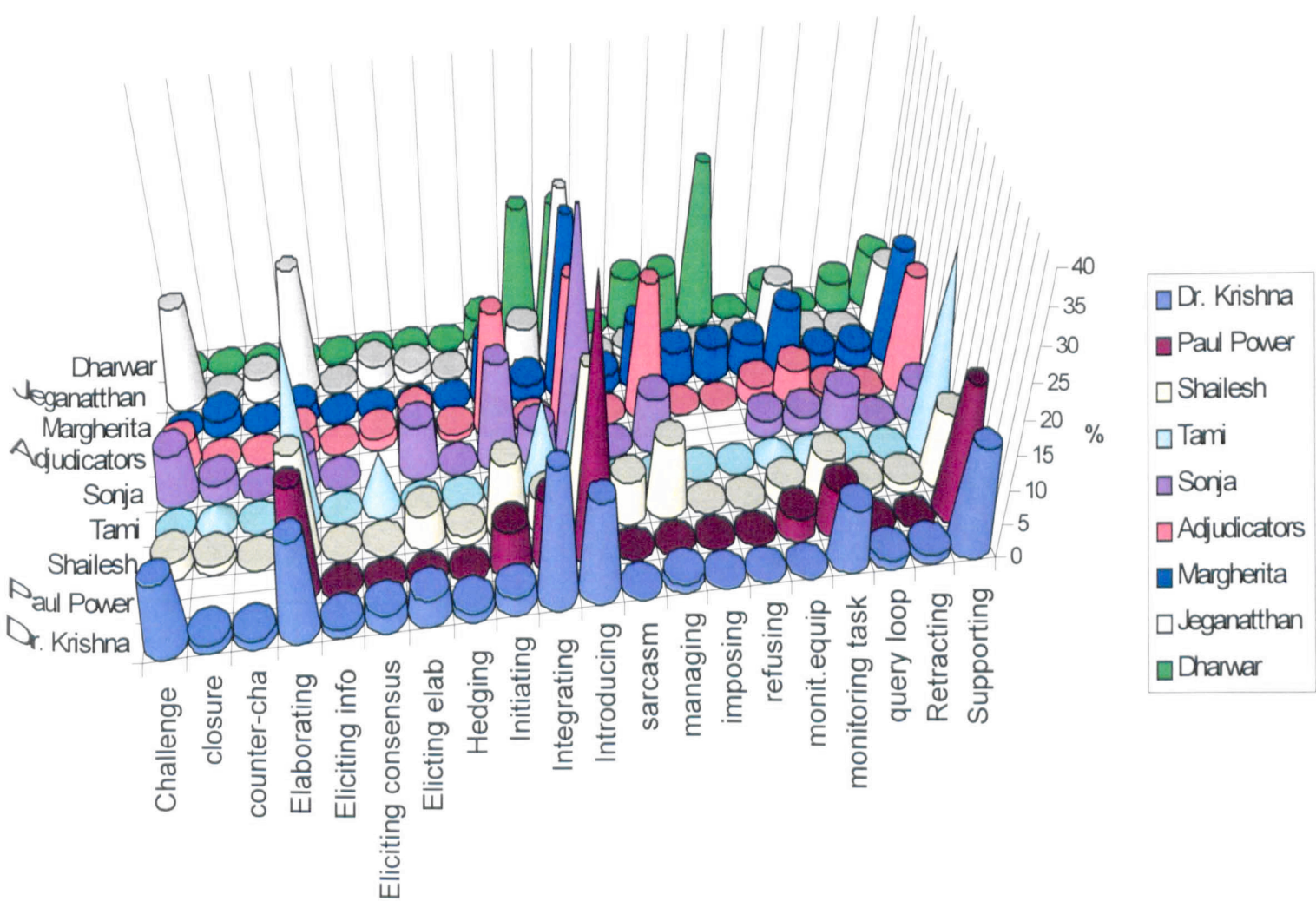
Figure 3-4 shows that about 10% of the allocated time for discussion is used by the teacher to give instructions. Then the groups display different performances. 4 groups (Tami, Power, Dr. Krishna and Jeganatthan) reached the stage of summarising their argument, and they also displayed less off-task talk, compared to the other groups. One group (Sonja) also displays a short spell of summarising, but the high percentage of time spent without recording perhaps reflects the group's difficulties with the task. Similar conclusions emerge from the groups of Margherita and Dharwar. Only half of the class thus appears to have begun to assimilate some information about their roles.

The analysis of the collaborative moves – in Figure 3-5 overleaf – complements the analysis of the epistemic episodes, adding some more information about the groups' internal dynamics. In the chart, a large proportion of groups' moves are found around the term 'introducing', which shows that for all groups the main activity was that of 'pooling information'. 8 groups gave some evidence of 'elaborating' and 'integrating', showing that students had to some extent engaged in discussion activities. On the contrary, for the 2 groups of Dharwar and Margherita, the analysis of the collaborative moves displayed episodes of moderate cooperation, with moves such as: 'imposing' and 'refusing'.

The chart displays the frequency of each category move in the different groups. Because the values are expressed in percentages, the height of the pyramids was calculated on the basis of the relative values. For example in the Tami group, the full pyramid in the ‘eliciting consensus’ category indicates that this group made most use of this category, as compared to the other groups.

The evidence presented so far points towards some difficulties in performing discussion. If the assimilation of the part was related to discussion and consensus, then it seems that only some groups managed to go beyond the pooling of information to find a common perspective and build agreement/consensus.

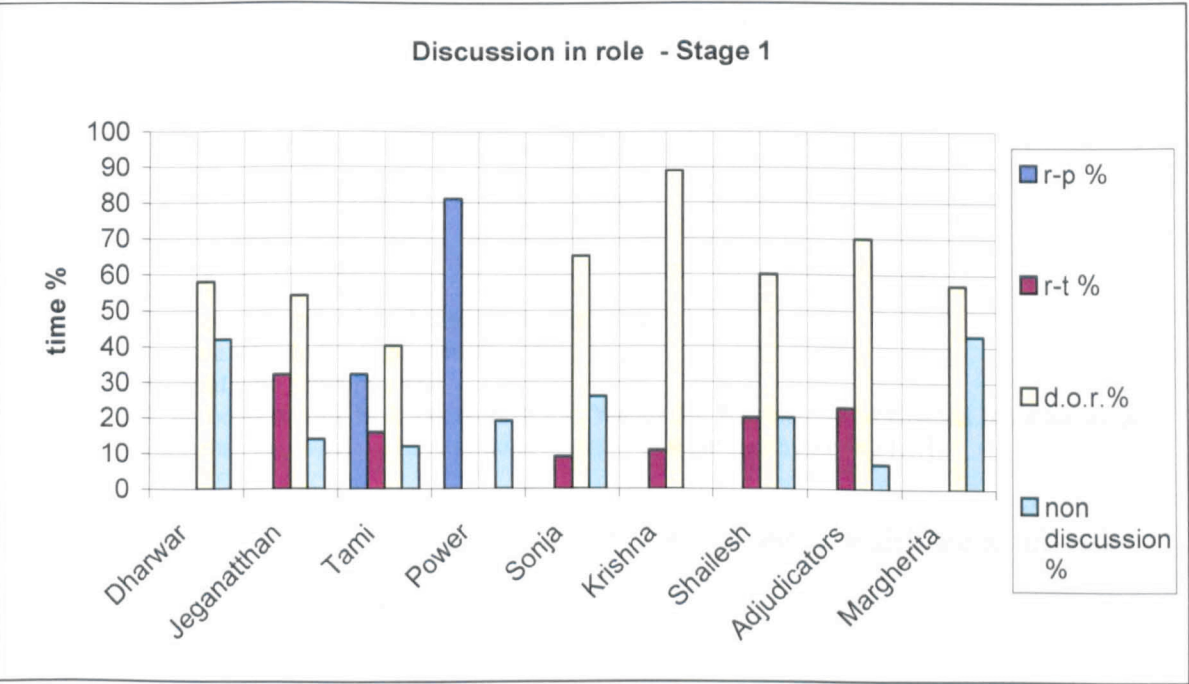
Figure 3-5 Collaborative moves in the first lesson



3.4.6 Discussion and role-taking

The analysis of students’ talk showed discontinuous role-playing activity. In Figure 3-6, the bar-charts give a breakdown of the performances of each group, divided in discussion in role, in which students expressed themselves in role (r-p), episodes of role-taking, in which students only briefly attempted to use the first person (r-t), and discussion out of role (d.o.r). The time the groups spent in silence and the time spent listening to the teacher’s introduction was labelled as non-discussion. In the chart, it appears that role-playing was limited, with exception of two groups (Tami and Power). There were some episodes of role-taking in 6 groups but such episodes did not turn into fully developed discussions in role. There was also a lot of discussion out of role.

Figure 3-6 Role-playing activity for Stage 1 in the first lesson



From the combined observation of the groups’ collaborative activity and the role-playing activity (Figures 3-5 and 3-6) it seems that while the groups’ talk was frequently interrupted, those groups which made most use of supporting and integrating moves were also more likely to take on role (e.g. Jeganatthan, Tami, Power, Krishna).

This suggests that a link can be made between role-playing and effective group discussions, and that one can be supportive of the other. Further exploration of the social dimension in role-playing was conducted by qualitative means, as follows, to cast light on students’ successes and difficulties with the task.

3.4.7 Excerpts from students' talk in small groups

Two groups, Tami and Dr. Krishna, took considerable amount of time to understand the new task (e.g. the objective of the task, the rules of the role-play):

For example in Dr. Krishna (off-task event):

Boy 2: are we supposed to put up an argument

Boy 1: I think we have..

Boy 2: .. or we're just putting across the point of view that...

Boy 1: point of view, yes.

The excerpt immediately shows that the task was new and the group spent some time working out the purpose of the task. Subsequently, the group was still deciding about the nature of the argument, as presented below, and it was difficult to empathise with the character and find consensus. In the following excerpt, the group begin to talk in the first person 'we' only towards the very end of the transcript:

Dr. Krishna (off-task event):

Boy 2: so what is our argument

Boy 1: so our argument is to keep the prawns..

Boy 2: .. we want to keep the prawns

Boy 1: .. but have them in a safe...

Boy 2: no because look look that is the thing. We are Dr. Krishna... and Krishna is not aware of the problems... so what we have to do is to start our argument by saying [...]

A degree of self-consciousness affected students' performances, which led to off-task talk and interruption of the recording:

For example in Shailesh (off-task event):

Boy 1: Shall we rewind it? That was a load of....piribi!

Boy 3: We'll have to start all over again.

(...)

Boy 1: I'm not used to being on a documentary program.

[long pause]

For some students it was difficult to conceptualise the actions of their character and it looked as though students were unfamiliar with adult roles, such as the civil servant. The following excerpt shows the students talking out of role, and asking each other questions to figure out the thinking of the character and her goals:

For example in Sonja:

Boy 1: and what was it? Social conditions are declining and the economic growth that the prawn farms would produce...
Boy 2: He gets money from it.
Boy 1: Yes... However it does cause the soil to be, to degrade and this affects farmers...
Boy 2: They can sell all their prawns though, so they don't have any left over... yeah

In other cases, students argued about moral values and the meaning of non-violence. The following excerpt shows an attempt by the group to explain the concept in terms of practical actions, and a short attempt by the girl to take on role:

For example in Jeganatthan:

Boy 1: what is simple life, what does he wanna do...
Girl: everybody, every family can have some land of their own to raise, we are religious people and we do nonviolence...

For this group, it is also interesting to look more closely at their epistemic moves, which include appeals to rules and examples, as the students try to persuade one another of the meaning and value of being non-violent:

Boy 2: do you know... (giggles) we are <u>non-violent!</u>	Appeal to rules
Girl: giggles, yes that's what I was saying, we are really nonviolent (overlaps with Boy 1)	Appeal to rules
Boy 1: that's what I am SAYING (overlaps with Girl) , you know, we should change our ways though, we should change our ways and become violent (...)	Appeal to example
Boy 1: I mean, you know that's the only way it is gonna work	Evaluation
Boy 2: it is not a good idea (overlaps with Boy 1)	Evaluation

In contrast, when students took on a shared voice, they could 'elicit' consensus and they spoke in role:

Tami (1st minute in the transcript):

Boy 1: We are representing Tami Sunetra and this is what we have to say (...) OK, the prawn farmers are cutting down the mangrove trees around the coast, to run pipes from the sea to the big prawn farms.	Eliciting consensus Introducing
Boy 2: Yes, yes, yes	Supporting
Girl: yes	

When in role, they made references to the moral dimension of their actions and adopted rhetorical strategies related to the task of persuasion.

For example in Tami:

Boy 1: The people of the southern region of India <u>lost ten thousand hectares</u> of coastal land when the government sold it to industrial companies for the prawn farming	Appeal to source	Out of role
Boy 1: The land can no longer be farmed on because it is all crusty and salty	Appeal to scientific knowledge (rhetorical question): appeal to instances	Out of role
Boy 2: <i>How are we meant to make food with no land?</i>		Role-playing

Action in role sometimes featured particular linguistic and argumentative strategies such as the use of examples and the making of comparisons, with the goal of defending and justifying their position:

For example in Paul Power:

Boy 1: People in European countries think that it is their place <i>to criticise us</i> or try and help out all these third world countries, <i>for instance</i> in England they cut down all their forests and now they are criticising the people in Brazil for wanting to cut down the Amazon Rainforest <i>and they can't do that.</i>	Predication Appeal to examples Appeal to rules	Role-playing
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3.4.8 Teacher and students

Some students had great difficulties with the task and they repeatedly sought the help of the teacher. For example one boy, in the Dharwar group, said: ‘*You see, we don’t actually know what to say*’. In response to this request the teacher gave them an example of how to present themselves in role: e.g. Dharwar:

Teacher: ‘Right and these are all arguments that you would want to put in. To say that if this carries on these are the things that are going to happen in my village, this is why I am concerned, this is why I would like the fisheries to stop. So feel free to write on the back of these, a list of points perhaps that you would like to make in the discussion at the end (*continues*).

However, despite the help of the teacher, (and subsequently the researchers), the group did not progress. Similar problems were encountered by the Sonja group. This excerpt

presents the teacher trying to clarify the rules of the game to the students: e.g. Sonja,
E1:

Teacher: ‘You need to become this person that is the idea. In a role play the idea is that you become Sonja Ray, Minister for the Development of India, okay. Between you, you have got to decide what she would think, what would her views be and then it’s that discussion that we want to record...’

Throughout the course of the activity the students asked the teacher for help several times, yet the teacher’s efforts did not seem to be successful. The evidence gathered in the course of the analysis seems to point to the need for students to understand the task and be autonomous. In other words, successful participation of the students in the role-playing activity appeared to be linked to more than just having rules and scripts, but depended on the degree to which students in groups managed to motivate one another, think together and be creative as a group. This inevitably highlighted the difficulty for them to think quickly about ideas and ways of working in the new task, and similarly for the teacher to change his role. At the end of the activity, the teacher reported to me that he needed to be more familiar with the role-play technique. The new teaching and learning situation required him to act in a different manner, but he felt that he was not able to respond effectively to students’ needs in the context of the role-play.

3.4.9 The presentation of the characters during the simulation of the Court of Inquiry

The discussion was coordinated by the teacher who sat on the panel with the adjudicators. The discussion unfolded in an orderly fashion, presentation after presentation. While observing, I was struck by the fact that students were mainly only reading their cards, as opposed to making personal interpretations. However, in the course of the interaction with the adjudicators some students began to respond by using the first person and some students attempted to elaborate personal answers. Those groups which showed a little more role-playing were the same groups which had displayed more discussion in the previous task. A summary of students’ performances is presented in Table 3-J. The table shows that during the Court of Inquiry students varied in their ability to present themselves in role. Four groups managed to make a smooth presentation; three groups attempted to talk in role but they heavily relied on the role-cards and read them aloud. 1 group was entirely out of role and did not manage to make a presentation.

Table 3-J Students’ ability to present themselves in role in the Court of Inquiry (pilot study)

	Type of speech	N. of Groups	Groups
Out of role	The answer is not consistent with the character	1	Dharwar
Role-taking	Reads the card	3	Margherita Sonja Shailesh
	Ask questions that are in role with the general role of an adjudicator	1	Adjudicators
Role-playing	Use of the first person with creative interpretation of the information	2 + 2	Power + Tami Krishna + Jeganatthan

As part of their role, the adjudicators were in charge of asking questions. They had been briefed by the teacher and they knew that the goal of the Court of Inquiry was to elicit evidence from the groups in order to ‘*explore both sides of the argument*’ (Teacher, introductory session). To this end, the adjudicators sometimes chose to adopt the strategy of the devil’s advocate: ‘*asking questions that would deliberately challenge the speakers*’ (adjudicators, E3, group discussions). The adjudicators’ questions were often challenging and probing, and the reading of the transcript effectively conveyed this dynamics of attack-defence. Questions were aimed at revealing the characters’ weaknesses and deficiencies, as opposed to encouraging dialogue and further thinking. In this context, the groups varied in their ability to sustain their roles and to give effective answers (Table 3-K). The groups’ contributions ranged from withdrawing from the interaction (i.e. to minimise, suffer, avoid), to adopting assertive attitudes (attack, ridicule). Only 1 group, Tami, used language as a means of persuasion.

Table 3-K Groups' responses during the Court of Inquiry

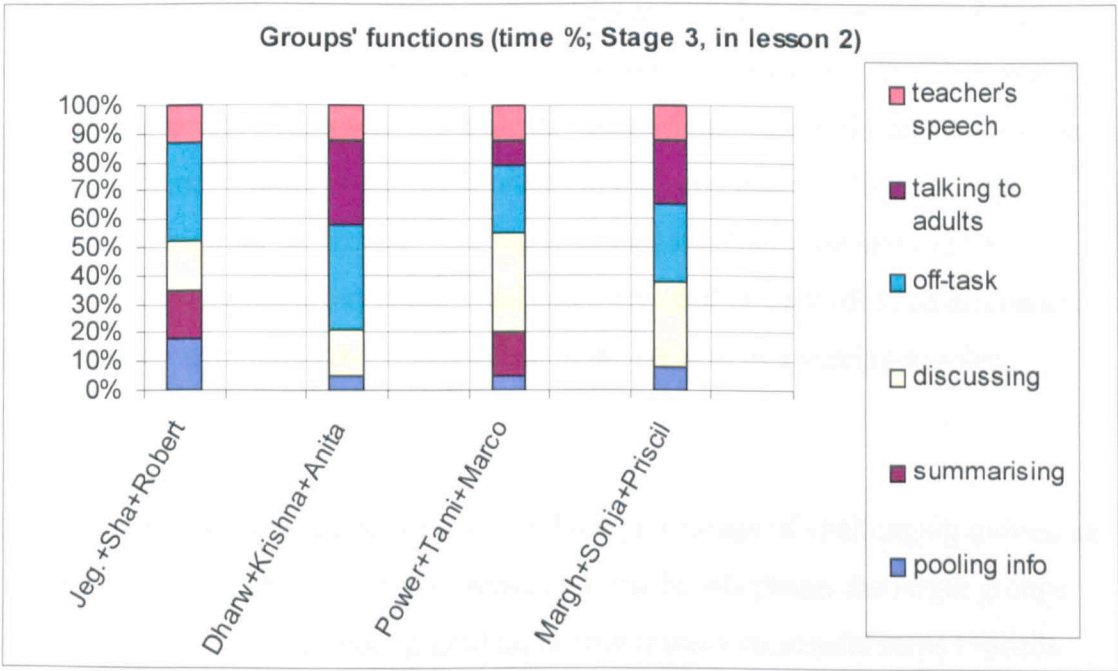
Strategies	Example of speech	Groups	N. of times
To minimise	Marco (boy) (adj): How do you feel about any environmental issues?	Sonja	3
	Sonja (boy 1): We will try and tackle those problems as they arise.	Margherita	1
	Robert (girl) (adj): Do you know what the environmental issues are?	Dharwar	1
	Sonja (boy 1): Yes, and we are going to try and tackle those when they arise		
To ask someone for help	Marco (boy) (adj): How will you tackle them?	Sonja	
	Sonja (girl 1): We will get in environmental experts.		
	Marco (boy) (adj): hmm, hmmm		1
To ridicule	Robert (girl) (adj): How do you feel about the environmental issues?	Shailesh	1
	Shailesh (boy 2): I don't care about the environmental issues	Power	1
To manipulate	Power (boy 1): (...) Not only are we doing that but also we are saving the children who are dying. <i>Do you want the children to die?</i>	Krishna	1
		Power	1
To perform dialogue through persuasion	Tami (boy 1)(<i>addressing Doctor Krishna's speech</i>). Yes. Prawn farming is good but it is a short-term solution to this malnutrition problem and now it is causing many other problems in return. One did you know that on the farms the land is being ruined by the salt, <i>so that all we can eat is prawns (...)</i>	Tami	2
To avoid	Dr Krishna (boy 2) (<i>responding to Tami</i>): well first of all, Did I mention that I trained in America so I didn't know of these problems? Secondly I was not aware of such problems. Sorry, I made a mistake. Goodbye. Thank you	Krishna	1
To attack	Power (boy 1): Now, if the American farmers meet occasional problems just imagine what it would be like for the farms in the hands of the <i>ignorant peasants</i> peers: yeah, yeah, clapping hands	Power Jeganatthan	3
To suffer (playing the victim)	Paul Power (boys 1 and 2): <i>some noises, jokes about Jeganatthan</i> Adult: Go on, please finish. Jeganatthan (girl 1): yes, they are destroying <u>our land</u> ; We can't make rice or anything else to eat so <i>now we are all dying because we can't eat anything</i>	Jeganatthan	1

At this point in the activity, the analysis of the data indicates a competitive context, in which the characters could be either winners or losers, and this impression was supported by students' comments at the end of the activity (as presented later in section 3.4.12). During the observation, I was also surprised to observe that after the bell rang, students were reluctant to stop the role-play. Students were interested in the debate and the discussion of the different points of view, and this was confirmed later by the teacher. The analysis of the transcripts from the second part of the activity produced evidence of students' thinking and states of mind after the adjudication.

3.4.10 The second lesson and the experience of conflict

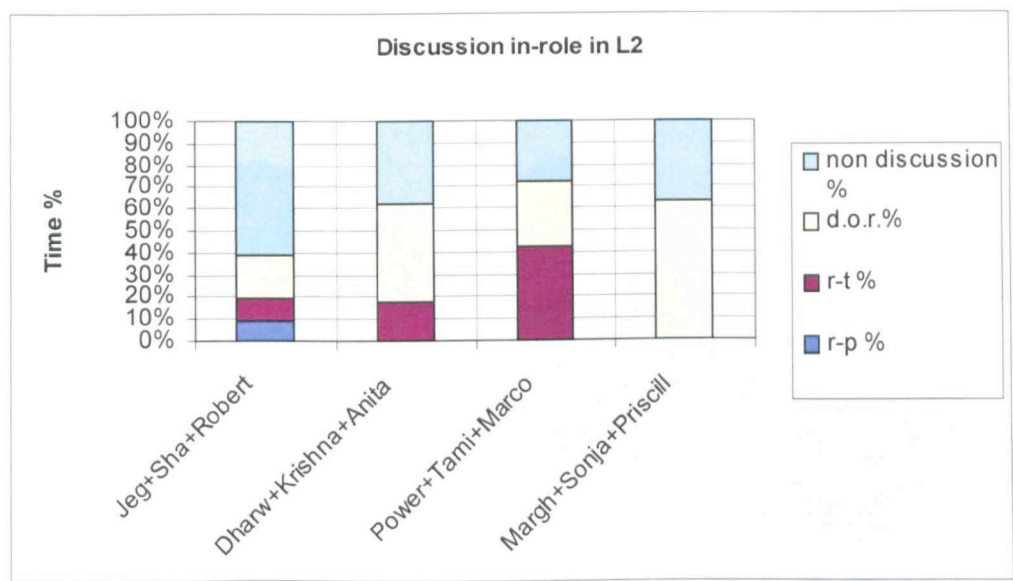
For Stage 3 of the activity, which took place in the second lesson, students were grouped in larger groups of opposed opinions, to simulate dialogue in conflict. Figure 3-7 shows the analysis of the epistemic episodes for this second type of discussion. The four bar charts indicate that all four groups were no longer concerned with reading and gathering information: a large part of the transcripts comprised off-task and discussion events. This finding is reinforced by my own memory of the activity: the groups did not pay attention to the information sheets they had been given in the previous lesson, but spent most of their time talking. There are also long sections of talk in which students were off-task (mainly ‘joking’), or asked the adults for help. The chart in Figure 3-7 below shows that the recordings are equally constituted of on-task and off-task talk, which indicates discontinuity in the flow of discussion.

Figure 3-7 Percentages of groups’ discussions in Stage 3



We can now turn attention to the indicators of role-play. The following chart (Figure 3-8) gives an overview of the time (in percentage) that students spent role-taking (r-t), role-playing (r-p), out of role (d.o.r), and in off-task/not-discussing events (e.g. joking, the teacher gives instructions etc...) in Stage 3.

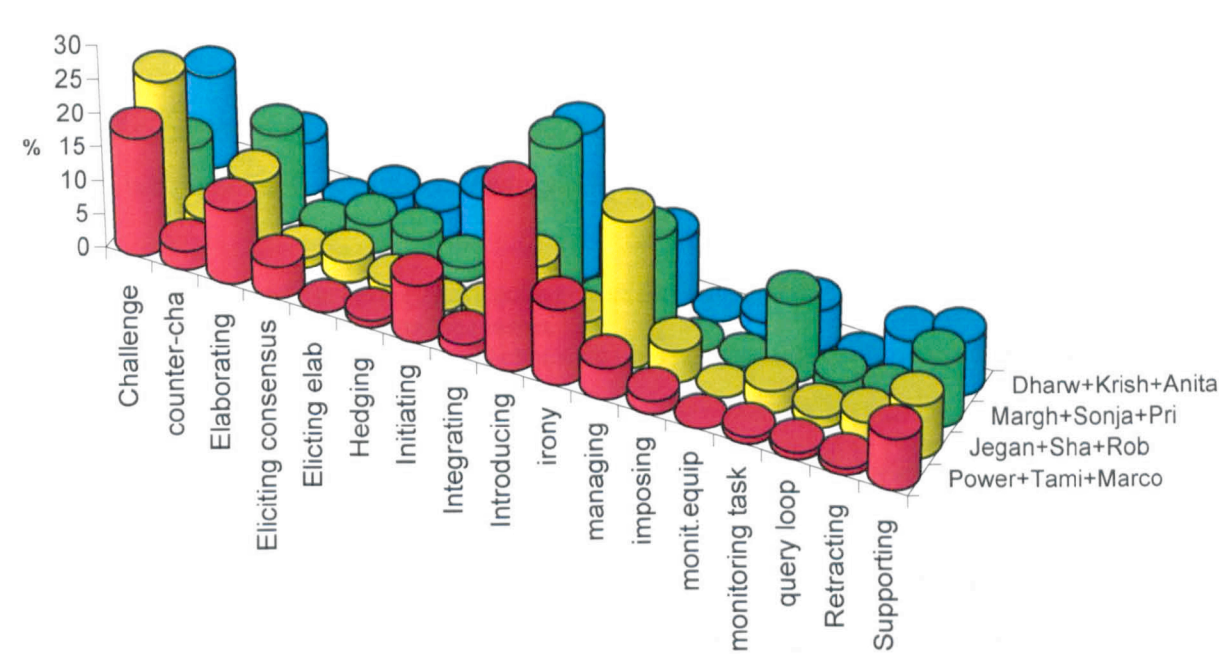
Figure 3-8 Role-playing in Stage 3, in lesson 2



The chart indicates that also in Stage 3 there is very little talk in role. Students in the Power+Tami+Marco group made use of the first person to introduce themselves and this was indicated as role-taking. However, as also suggested by the analysis of the collaborative moves, in Figure 3-9, the presence of verbal moves such as, ‘challenges and counter-challenges’, suggests that students’ discussions were still framed within an adversarial context. Another observation relates to the percentage of ‘introducing’ moves, which is high for all groups. This suggests that students were making verbal moves, but these were not always supported and integrated in a coordinated discussion. As will be further detailed in the next section, in the process of speaking in roles, students also ‘took sides’

Figure 3-9 shows a stark contrast between the high percentage of challenging moves, as opposed to integrating and eliciting consensus moves. In this phase, the larger groups experienced conflict and are making gradual but not always successful steps towards resolution.

Figure 3-9 Collaborative moves after the adjudication



An excerpt from the Dharwar+Krishna+Anita group provides an example of the adversarial climate in which students found themselves after the adjudication:

Dharwar (boy 1): building tanks? Why don't we do that and get US funding?	Initiating
Dr Krishna (boy 1): Yeah, let the bloody Yanks pay for it.	Supporting
Dr Krishna (boy 2): yeah that adjudication pissed me off (<i>referring to the adjudicator</i>). You just said we are gonna stop. That's it	Challenge
Anita (girl): no, I didn't...	Retracting
Dr Krishna (boy 2): you didn't say, you didn't give anything out. You didn't say any kind of other solutions.	Challenge
Anita (girl): we weren't allowed to.	Introducing
Dr. Krishna (boy 2): No?	Challenge
Anita (girl): No.	Counter-challenge
Dr. Krishna (boy 2): ah right	Retracting
<i>Overlaps.</i>	

In sum, after the adjudication, students found themselves dealing with a situation of conflict and contradiction. The following excerpts from students' discussions show how the different groups approached conflict, and how they managed to find their way through the task.

3.4.11 Examples of speech from Stage 3 – dealing with conflict

The analysis of the second part of the activity focused on describing the groups’ choice of strategy for handling conflict: i.e. negotiation, mediation, creative search of solutions. A common observation across the four groups was that students in role entered a climate of symmetrical exchanges at the beginning of the activity, in which they argued for their own personal interests. For example in Jeganatthan and Shailesh group:

Jeganatthan (boy 1): yes they have gotta give us some compensation. Give us some of the profit they make from farming the prawns.
Shailesh (boy 1): This is just one side but what does ... what does ... Shailesh actually gain from this!

● Students in role take side and polarise: you win, I lose (and vice versa)

Students from the Power+Tami+Marco group, comprising all boys, did not manage to build consensus. Some students expressed sarcastic comments which prevented the dialogue from continuing. For example:

Power (boy 1): There are other sources of protein such as Soya and bean curd.	Focus on the future
Tami (boy 3): Yes exactly, why don’t you just send them tins of baked beans?	Sarcasm: no progression
Power (boy 1): Or not! We could just grow it in the soil, ok?	
Tami (boy 1): take out, take out, take out you know how they have all these farmers using their hands to grow crops, yeah basically take out a loan and buy some tractors so they can harvest more stuff. And pay the money back with the crops they grow	Focus on the future
Power (boy 2): You will use some money then	
Tami (boy 1): I will then, I will, I have got it right here. It is right on the table you can see it.	Playing up: no progression
Power (boy 2) : oh yeah	

Students’ excitement was made evident in the course of the activity, with some loud exchanges and background noise. At the end of the session, when students made their final presentations, the teacher felt the need to reprimand students in the Power and Tami group, to put a stop to their vociferous interaction. The intervention of the teacher effectively brought the class to a state of silence and embarrassment. It was interesting to notice however, that in spite of their excited behaviour, students in this group did have some valuable contributions to make (e.g. they thought of alternative sources of protein, such as Soya, as presented in the excerpt above), and as it will be found in the questionnaires, these students did feel involved in the role-play. Such evidence suggests that conflict generated emotional arousal and students attempted to cope with it in their

own personal manner. The task was obviously difficult for them to handle, and quite clearly these kinds of activities were not usually to be found in the science classroom. Some examples of talk from the other three groups cast light on the kinds of strategies, i.e. compromise and negotiation, that the groups put in place to settle the dispute.

- **Negotiation, compromise and mediation**

The following examples show two groups’ attempts to find a workable solution for the two parties. When the groups practiced with negotiation, the reading of the transcript effectively conveyed the feeling of an engaged discussion, with interconnected epistemic events and topic switches, but the students’ contributions are out of role. In the following example Shailesh made use of the third person (‘they’):

For example: in Jeganatthan+Shailesh+Robert:

Shailesh (boy 1): I basically think that if they spent a bit more money on these prawn companies and made them better and looked after them properly then they wouldn’t destroy the land and they wouldn’t have to abandon them. And if they did need destroy them then it wouldn’t be so often

Compromise

Also the other two groups tried the route to mediation. In both cases, the adjudicators took part in the discussion by changing their roles, from judges to mediators. By so doing they took responsibility for the mediation process and they helped the groups by suggesting and eliciting viable alternatives and solutions for the two parties. The following examples illustrate the actions of Priscilla and Robert, who were trying to balance the cost and benefits for the prawn farmers and the villagers:

For example, Margherita+Sonja+Priscilla:

Priscilla: Yes yeah try and reuse the land, reuse the land for the prawns, keep keep using the same piece of land for the prawns

Compromise

For example, Jeganatthan+Shailesh+Robert:

Robert: They should give half of the money they make

Negotiation

• **The outcomes of the negotiation: science, technology, environment and society**

As part of the negotiation process, the groups pulled together a number of technical solutions for the problems caused by prawn farming in the local environment:

For example: in Jeganatthan+Shailesh+Robert:

Jeganatthan (boy 2): Or they could try and filter out the salt
Shailesh (boy 1): Yes!

For example in Margherita+Sonja+Priscilla:

Sonja (girl 1): Luke, You haven't said anything yet.
Sonja (goy 2): Yes because I was going to say something about some tablets, which purify the water.
Sonja (girl 1): oh, yeah.

Some examples of students' talk referred to social and economical aspects of the issue. Students were concerned about community life, education and fairness (such as better wages for the farms workers), and their attention was focused on the local context:

For example in Jeganatthan+Shailesh+Robert:

Shailesh (boy 2): Has anyone got another idea?	Focus on the local community
Robert (girl): Basically we should improve public relations amongst the community	

For example in Darwar+Krishna+Anita:

Anita (girl): I think they should use some of the money to train the Indian people so that some of the money goes back into the community.	Focus on the local community
--	------------------------------

In summary, in the second part of the activity, students in role experienced the situation of conflict. In one group, students took sides and conflict escalated, with episodes of sarcasm, which did not help the group to reach a viable conclusion. In the other three groups, students tried the route towards mediation, but this required them to come out of their roles. The adjudicators changed roles and acted as mediators and dispute-settlers. In this scenario, students did not demonstrate dealing with conflict by empathetic dialogue.

We can now turn attention to students' feelings during the activity.

3.4.12 School 1 - questionnaire results

Questionnaire 1 – part A: How did I feel in my role?

For the first questionnaire, administered after the simulation of the Court of Inquiry, the focus of the analysis was on ascertaining students' emotional involvement with their roles, and the presence of positive and negative emotions, which would either bring students close to their roles or alienate them from the activity. The analysis of students' answers revealed a variety of different aspects related to role-playing. In line with the results obtained from the analysis of the transcripts, students reported difficulties with taking on role. Some students experienced feelings of uncertainty, and difficulties with getting into character by means of empathy:

*I was not sure of how my character would feel toward the prawn farming.
In my role as Shailesh I am not very certain how to argue for prawn farming.
I felt a little out of place as I am not an old man and I can't be aware of the exact circumstances so I can't tell how desperate these people are.
I felt it difficult to play because as I was aware of the terrible side effects Dr. Krishna knew nothing of them so I could not really defend myself very well against questions by the opposition.
I was a little confused about what our role actually entailed. With tribe members you could tell exactly what they would think about prawn farming but our character I did not understand.
I felt uncomfortable at first, partly because I do not feel exactly the same way as Jeganathan about prawn farming.
I think this is because I am personally against it and also there are not very many points we can argue.*

Some students were unclear about and unfamiliar with the procedures of the activity:

*I felt embarrassed when I had to talk in front of the tape recorder and we did not really know what to say sometimes. Unfamiliarity with the equipment
O.K. but I didn't really understand all of the task!*

In line with previous observations derived from the analysis of the tape-recorders, students in the role of Tami and Paul Power experienced some role-taking:

Three students were in the role of Tami:

e.g. I feel my role was that of very strong and environmentally friendly concepts-. She obviously had experienced the horrors.

Two students were in the role of Paul Power:

e.g.: I feel my character had a fairly strong argument.

e.g. I feel that Paul Power views are correct in the way that India needs development.

One comment expressed by a student in the Margherita group is not in line with previous analysis of students' discussions, and it constitutes a surprise:

I think I really got into the role of Margherita. I felt I was talking through someone else.

The analysis of students' comments also suggests that students were sometimes involved at the cognitive, emotional and social level through role-playing and group work. For example, students appreciated being involved in a process of thinking and evaluating:

*I felt that I knew all the arguments for + against
The discussion was very interesting because of the amount of pros and cons. It'd be interesting to hear the result.
I felt like the prawn industry was needed.*

Some students made comments about their emotional involvement, and expressed a sense of responsibility towards their role and duties:

*He [paul power] could be a little more sympathetic. Otherwise, I enjoyed the experience.
I did understand where he was coming from and felt some sympathy for Dharwar.
However I did not argue my points very well, or in great detail.
I felt power – yet restraint as I had the fate of????? resting on my stem shoulders and I had to stay alert to make the best decision.*

In the course of the first part of the activity, when the groups were preparing themselves to take on role, students felt uncomfortable in taking on a new perspective and did not seem to have had the opportunity to really know about their characters. However, some students felt feelings of sympathy and responsibility for their actions and through the emotional connection they managed to express a sense of participation in the understanding of the events.

Questionnaire 1 – part B: after the adjudication?

In line with what was found in the course of the analysis of the transcripts, the adjudication triggered strong feelings, which ranged from anger, to a sense of concern and excitement. Two students in the Paul Power group and one student in the Dr. Krishna's group felt anger:

*the short-sighted judges could not see further than their own opinion (Paul Power)
I feel that India will not economically develop if you have narrow minded adjudicators (Paul Power)*

I am OUTRAGED!! How will the villagers survive without the vital food that prawns provide (Dr. Krishna)

Students, who expressed a sense of uncertainty about themselves in role, displayed a sense of concern for their character:

I am very unhappy. All my money went into this business. My marriage will probably fall apart. I do not know what I will do, all this work for nothing (Shailesh)
I remain concerned about the great health issues involved. I understand the decision was made for the long run but nothing was mentioned about the health risks (Dr. Krishna)
I feel that it is unfair on the people, lots of jobs and food will be lost (Sonja)
I felt that they should have allowed the prawn farms to carry on because they would bring lots of money to India.

There also were mixed feelings about the adjudicators:

I was not pleased with the eloquence of Robert's summary
I think the adjudicators made the right decision regarding the arguments presented.

In contrast, students who agreed with the result of the adjudication expressed feelings of satisfaction/victory:

I am glad we won the debate, we deserved it (Tami)
I felt my role has justice and got what they deserved (Tami).
I am very happy about the outcome of the adjudication – it will save the lives of many members of my village (Dharwar)
I feel that it went well for me because it was the outcome we wanted (Dharwar)
The adjudication was well thought out and fair and took into account our argument (Margherita)
I am very pleased with the decision. It is definitively the right decision. I just hope some action is actually taken (Jeganatthan)

The adjudicators made comments on the adjudication process, reiterating some of the reasons in support of their decision. One student suggested the need for a compromise decision:

I wanted to make a compromise but as this was not allowed. I felt that the decision we came to was right + best for the people in the long-term.
I feel that we probably came to the right conclusion. Given more time to interrogate the parties then I think we could have come to a more informed decision.
I feel good that it was stopped (Adjudicator)
The best resolution in the long run for the people was to stop prawn farming.

Three other students however also felt that there was a need for further inquiry into the problems:

I would like to explore this topic in more detail with more time.
The decision was good but more could have been said about the issues.

The adjudicators provided no alternative for food and I think it is a childish and fairy tale decision.

Hence, after the adjudication students had mixed feelings about the possibility to resolve the issue.

Questionnaire 2: students' comments after the activity on conflict resolution

Twenty-three students answered the questionnaire. Students' answers to the first question in the questionnaire showed that immediately after the adjudication, students were polarized. Six students felt disappointed and angry; eleven students said they felt victorious. One student expressed the need to discuss further:

I would like to challenge a few people's points (Tami)

Four students in the role of adjudicators highlighted their effort and desire to being fair:

e.g. The adjudicators' personal commitment to fairness

e.g. as if an amicable conclusion had been reached (Robert) and pleased (Anita)

One student did not give any answer.

In the second question, the majority of the students reported feeling of satisfaction. They felt that the issue had been settled (fifteen students), and they were willing to take action (three students). 1 student specified the need for meeting people's needs:

e.g. willing to take action... to ensure I get what I need, whilst keeping others happy;

Two students from the Paul Power group were still feeling angry:

e.g. Angry... because there is no real solution

e.g. willing to take action... by blowing them up

When students were asked to write down their ideas for tackling the issue ('*there is something I wanted to say and it has not come up*'), students listed several elements of concern, ranging from technical solutions for the local environment to the nature of the decision-making process. For example:

6 (where to get the money from to put actions in place)

1 (restoring the mangroves)

1 (give money back to the villagers)

1 (more questions to ask to the parties)

1 (how to get any income after the degradation of the environment)

1 (proper research on the side effects)

One student is still quite critical of the prawn farming business:

I think we are giving maybe too much to keep the prawns farms in business

As with the previous question, students' answers to the final question (*'I think the best idea for conflict resolution was'*) reflected the fact that students had been involved in the discussion of the controversial topic. The majority of the students (16) expressed some ideas for solutions, for example:

Improving the technology of prawn farming in order to save land

Limiting prawn farm production and clean/protect the land from salt

Making companies to take responsibility for their action

Alternative sources of protein

Two students referred to the process of decision-making involved, and for example:

Having an adjudication and for & against groups because it really transformed the reason as everyone got into roles.

Compromising

Two answers do not make sense:

Ours because it was the best;

Use atomic bombs to bomb them off because it would eradicate the problem

Questionnaire 3 - Students' evaluation of the activity: After thoughts

Twenty-four students answered the questionnaires. The first question was aimed at finding out if students had had the opportunity to think about the role-play again after it was done. The great majority of the students (22) gave a negative answer, and only two said they did. However, when asked to look back and think about memorable parts, students commented on all aspects of the role-play - the controversial topic and the verdict - as well as the conflict:

2 the debate; how I could have argued better

11 what the controversy was about

3 my role card

4 the verdict of the adjudicators

4 the resolution of the conflict

Equally detailed were students' reflections on their learning (*I learnt to...*), which pointed to learning of a number of skills, such as argumentation and cooperative working. For example:

argumentation skills	3	<i>to argue about the shrimp farm being good; to debate and find both sides of an argument + summarise briefly; to word my answers;</i>
cooperative work skills	6	<i>to take control of groups when they fall in disarray (Dharwar); to discuss opinions in a controlled fashion; to work with people I would not normally talk to cooperate with people I would not usually work with; to listen to others and co-operate; to talk in groups about an issue and write a speech about the conversation;</i>

Students were also aware of new attitudes, such as listening to others and reflecting:

To listen to others	5	<i>to listen to other people's opinion, while meantime having my own opinion; to listen to other people's opinion; value other people's opinions and try to see it from their point of view; to try and understand and relate to the people I am meant to represent; to listen to other people's ideas and views;</i>
Metacognitive skills	6	<i>think more about problems rather than just coming up with an answer;. there may be other sides to the story; to acknowledge the situation of prawn farming in other countries; to question how exotic foods arrive on my plate; discuss opinions; to have respect for all ecosystems; a lot about prawn farming;</i>

2 students pointed out to the elements of novelty of the activity:

Operational skills	2	<i>To speak into a tape-recorder; To try and work with speed to reach a satisfactory conclusion;</i>
--------------------	---	--

no answer

2

When they answered to the question *I learnt that...*, students mentioned the specific topic of prawn farming, but they also managed to derive learning of a more general kind, (i.e. by locating prawn farming within the global processes of food production and consumption). For example:

Content: The topic and context of the role-play	<i>that shrimp farms are a big part of food in India</i> <i>prawn farming is big in India</i> <i>about the problem of prawn farming in India</i> <i>prawn farms affect the surrounding inhabitants badly</i> <i>that prawn farming is very dangerous to local people</i> <i>prawn farming is bad for the environment but is important for the local people</i> <i>I did not know there was any problem about prawns before</i> <i>prawn farms were killing the environment in India but they were also good for India's economy</i>
---	--

Reflection: the relevance of the topic for everyday life	<i>that there are many dangers through food we eat every day</i> <i>that problems are more serious than they seem</i> <i>that the ecosystem is a very delicate thing</i> <i>that the gross quantity of prawns supplied to America comes from India</i> <i>there are problems all across the world and that everyone has a different perspective. The conclusion is unlikely to ever be satisfactory for everybody</i> <i>respect for all ecosystems is essential in order for a business to be successful</i> <i>there is a problem with some ecosystems that not enough attention is being paid to</i> <i>that it is difficult to resolve some of these environmental issues</i> <i>that I enjoy group activities... and that there are many problems due to prawn farming</i> <i>that wording my answers well was more effective</i>
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3.4.13 Results from School 2, pilot study

The data collection in this school was severely affected by external, unpredictable factors. On the first day of the activity we found out that some pupils did not really want to be in school, but they had been forced by the parents to attend classes. This state of the events also affected the second round of data collection, when the role-play was re-enacted on the second day. The class was out of control, with students walking in and out, and the teacher trying to gather them all together around the tables to work in groups. There were two strangers in the class (myself and the senior researcher) and it was quite obvious that the whole of the situation looked at some point rather bemusing. In what follows, some short examples will be given of what was recorded by the students, for the purpose of illustrating the circumstances of the day. For example, in the Shailesh group, students did not know what they were supposed to be doing: 13: Boy: *'I can't discuss it though, I don't know what to discuss'*. In the Dharwar group, discussion immediately stopped after a few turns:

Boy 2: What is our argument? Do we think it is bad? That prawn farming should be closed down? Because it affects the countryside basically and there are other social problems.

Tape is switched off.

Girl: And people are moving too.

Boy 2: Where they think they are going to find a better life.

Girl: Yes but it is not, it is actually worse.

Boy 1: We can talk about anything more or less. How can this take two hours?

Students disengaged from the task and lost interest: for example Dharwar, end of transcript, 5th minute, off-task:

Boy 2: What are we doing in the second lesson? Is it this again?

Teacher: No, we are going to do it another time.

Boy 2: Oh that is okay then.

And then another voice also addressed the teacher (it is difficult to distinguish from the recording if it is the same boy or somebody else from another group):

Boy 2: What are other issues more interesting than prawn farming? GM crops? Or Human cloning? Yeah.

Throughout the activity the teacher went round the tables asking some questions to the students. Evidence from the transcripts show that students did not grasp the meaning of the task (e.g. Jeganatthan, girl: *'we really don't get it'*), and did not manage to get into role:

For example Jeanatthan, E2: 1st minute of recording:

Teacher: here we have got land along the edges of India, you know the mangroves along Florida, where you have crocodiles and water, have you seen those pictures? There is an area of Florida that looks like this is in India. What would happen is that the sea would come in and bring fish and shrimp and things like that and they would just grow naturally, and the farmers would just harvest them naturally but now they intensively grow them in these ponds, like you saw in the film. Where is this character coming from? He is an old man, his view is that the government, like the green revolution tries to increase the rice crop and the blue revolution tries to increase the amount of prawns produced and his view is that he thinks these schemes don't work properly. When the government tries to get involved these it doesn't work from his point of view. Can you imagine being him?

Students' answers to the teacher's question confirmed that students found it hard to participate in the activity (*'we don't know what to say'*; *'We just don't want to do it'*).

When guided by the teacher, some students managed to put together a few exchanges, as for example in the Dr. Krishna's group:

Boy 2: They should sell a minority of it but not all of it, to keep their children alive.

long pause

Girl: I think they should try and get protein from other food as well, not just the prawns.

Boy: Such as?

Girl: Fish.

Boy: Yes because they are selling their prawns and other fish.

Girl: And meat.

Boy: But they haven't got much meat either.

Students discussed a little the information on the role-card, but they did not reach the elaboration of a point of view.

Students and researchers

Students were uneasy with talking with me and having to record their voice in the tape-recorder. In the Shailesh group, the opening episode in the transcript gives evidence of such feelings:

Laura: Now try and make up your mind what sort of person you are. How you are going to argue when you get to the United Nations.

Boy 1: Can I read this into there? *Refers to the cassette player.*

Laura: If you want to or discuss it with your friends.

Boy 2: Okay let's discuss it.

Boy 1: So why does this need to be on?

Boy 3: I don't know. But you are not allowed to swear.

Boy 2: I'm not reading that out. I don't have to.

It seemed better for students to be directed via simple questions. Excerpts from the Tami and Shailesh groups show examples of guided interaction between students and the senior researcher. e.g. Tami:

One of the students had read the role-card aloud when the interaction with the researcher began:

Senior researcher: What is it that he wants to happen to the prawn farms?

Boy 1: He wants them to be demolished.

Senior researcher: Why is that?

Boy 1: Because when they go away and can't be used anymore it leaves salt in the land so they can't grow anything, which leaves everybody starving.

Senior researcher: That is good. And how does he finish does it say?

Boy 1: We can grow nothing.

Senior researcher: Nothing.

Boy 2: And homeless too.

Senior researcher: Yes and the land. Why is it that the people are like this without any land?

Boy 2: Because industry took it.

Senior researcher: The government.

Boy 1: The government sold it all to the industrial companies.

Boy 2: They are greedy.

In this example, one student offered an opinion/judgement (*'they are greedy'*). The second part of the transcript showed students talking again about the problem of the land as they read through the information sheets and the role-card:

Boy 3: The problem for aquaculture is it leaves salt in the soil.

Senior researcher: What does the salt do when it is in the soil?

Boy 3: They can't grow anything.

Senior researcher: There you go you are learning. The problem is made worse by?

Boy 3: Using fresh water to dilute the salt water to ensure the health of the problems.

Senior researcher: That is right. So what sort of water do the prawns grow in?

Boy: Salt water, which is bad for the land.

Simulation of the Court of Inquiry

During the simulation of the Court of Inquiry the teacher acted as facilitator and sat with the adjudicators' panel. All groups were called to make a presentation and to answer the adjudicators' questions. In the simulation, the teacher tried to encourage students to present their roles. Some students completely misunderstood the content of their card:

Teacher: Okay who is Sonja? If we can hear you views on this.

Sonja: I am Sonja. We need to keep the prawns farming because it is bringing India more money. Fortunately our climate is just right for prawn farming and we want more money because we want to divide our country into three parts....

Three other students displayed a little role-playing:

Shailesh: My name is Shailesh and I am an Indian landowner.

Teacher: Right okay and what is your view of all this?

Shailesh: We think we should keep it as it is. We provide thirty people with work.

Teacher: So do you own farms?

Shailesh: Yes we own the land.

In the groups of Tami, Jeganatthan and Dharwar students make mixed use of the first (*we*) and the third (*they*) persons:

Tami

'I think the prawn ponds should be banned and they shouldn't make any more, because when they go away they leave salt in the bottom, which we can't farm on any more so we have a lack of food'.

Jeganatthan

Teacher: And so what would your ideal situation be?

Jeganatthan: That each family would have some land of their own where they can do their own farming.

Dharwar

'In our village, alcoholism is very serious. Everyone is going to the towns because there is no land in the countryside but it is not a very good lifestyle for them there'.

The Paul Power group withdrew from the task, announcing that *'they were unsure of what to say'*. The teacher then allowed the group to 'pass' their turn. At the end of the session this group was questioned once more by the teacher and the students managed to provide very basic descriptions of their role:

Paul Power: I am an American president with loads of money and I am willing to spend my money to help the people of India because they are very poor.
Teacher: So you want to help?
Paul Power: Yes.
Teacher: So you don't just want to make money?
Paul Power: No.
Teacher: So what do you think we should do? Do you think we should get rid of all these ponds or do you think we should just carry on? And what do you think we should do once we have got rid of them?
Paul Power: Make more houses and more shops.

After the lunch-break the adjudicators declared their verdict which was in support of the prawn farming industry.

3.4.14 School 2 questionnaires results

Questionnaire 1: How did I feel in my role?

Fourteen students completed the questionnaires. In the first question, students’ answers gave a clear sign of polarisation after the debate, with the taking position, either for or against:

No answer	2	
Against	7	<i>e.g. because of the loss of land and the impossibility to grow food;</i> By giving this answer 4 students contradict the reasons of their character (e.g. Paul Power); Only 1 student is in line with the character's ideas and she responds in role: <i>'for because I own a prawn farm'</i> ; Two students do not give reasons;
For	4	They do not give reasons

In the second question, they clearly specified that they had difficulties with taking on role:

no answer	3
did not feel in role	9
felt in role a bit	2

Students reported some emotional involvement:

angry	2
Pleased	10
Pleased while character is angry	2

Additional comments from students concerned their characters’ interests and feelings. Depending on whether or not the verdict met their interests, they either felt disappointed or happy about the decision:

They want their good land back (Dharwar)
‘I will be able to carry on with my business and will hopefully not lose anymore money’.

Two comments revealed mixed feelings about the possibility to compromise:

‘Pleased we have saved our prawns. Now we have the best of both’.
‘The results have been limited to compromise with the for and against’.

Questionnaire 2 - Students’ evaluation of the activity: After thoughts

Fourteen students completed the questionnaires. Students’ answers to the first question revealed that only 1 student had been thinking again about the role-play activity since three weeks before. Thirteen students gave a negative answer.

When asked to detail what they remembered, students pointed to all aspects of the role-play:

- 5 The role-card
- 2 The resolution of the conflict
- 6 What the controversy was about
- 3 The verdict

Students were also able to make some comments about their learning, referring to specific content, and the practice of argumentation:

Talking to others and argue	5	<i>Give my opinion;</i> <i>Speak out loud and listen to other people's view and take them into account!</i> <i>Give my opinion;</i> <i>Argue;</i> <i>Argue the right point;</i>
About prawns, the issue and the conflict	8	<i>The issue ;</i> <i>Resolve conflict on prawn, a debate and not violence;</i> <i>There are food problems in India;</i> <i>prawns have protein in them;</i> <i>prawns taste sour;</i> <i>things are more controversial than you think;</i> <i>Even though prawns are good they are causing problems;</i> <i>That there is a concern about prawns in India;</i>
No answer	4	

4 students did not feel they had learnt anything:

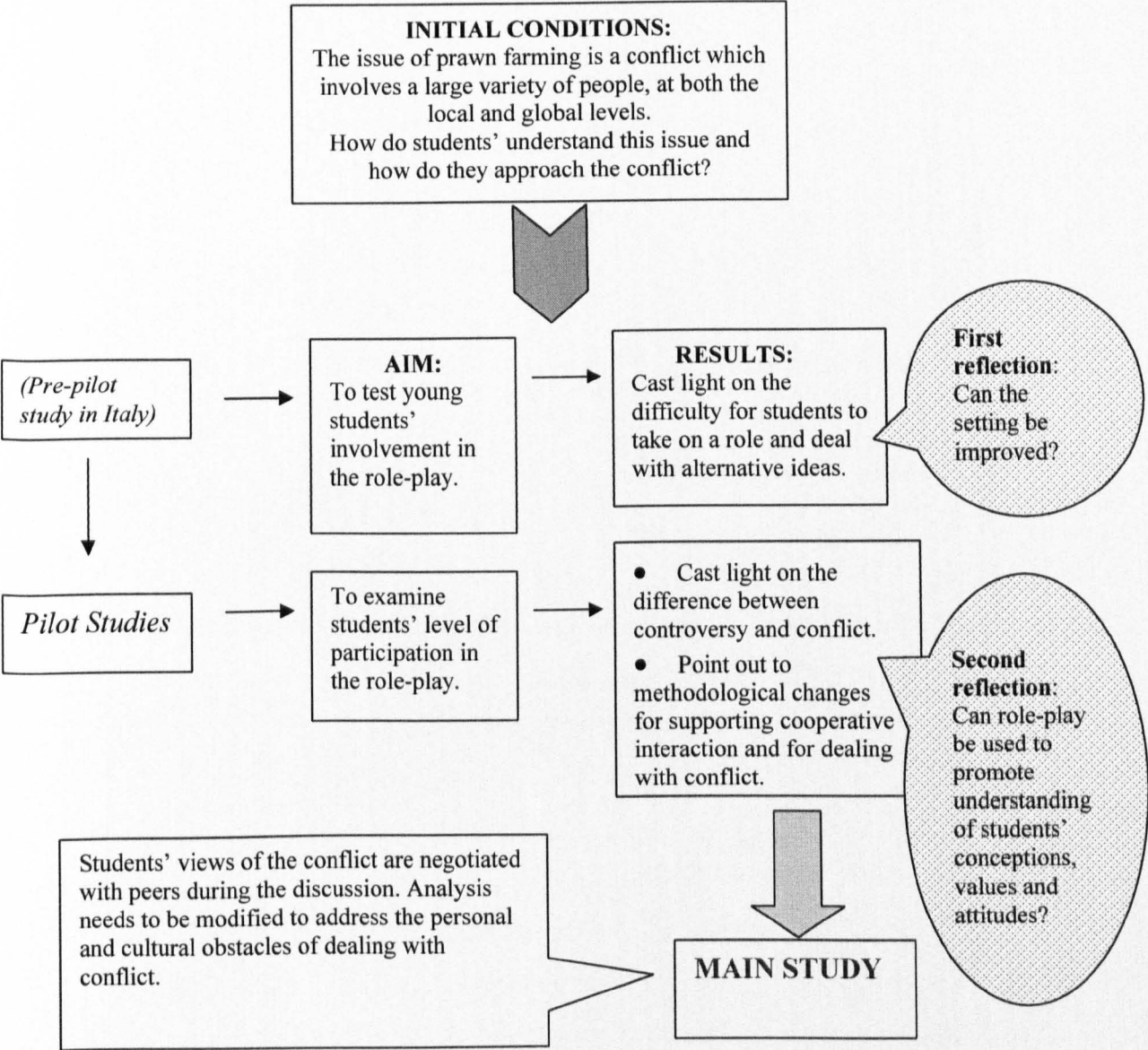
I learnt nothing	2
It was boring	2

The results from this school confirmed that the activity exceeded enormously the abilities of the students and the role-play was somewhat disrupted. While the results from the questionnaires showed that a little learning had occurred, the situation of the class on those two days did not allow drawing secure conclusions from the evidence gathered. In the next section I will discuss in further detail how the experience of the pilot study informed and shaped the main study.

3.5 Reflections and lessons learned

This research developed as a study of a role-play learning context in which students could deal with an experience of controversy and conflict. To this purpose, the pilot study greatly informed my understanding of students’ learning, with findings that ranged from social aspects of students’ interaction, to problems with understanding the character, working in groups and handling conflict. Figure 3-10 illustrates the development of my thinking throughout the pilot investigations. As shown in the Figure, the first thoughts were mainly concerned with the mechanisms of the role-play and the search for the conditions which allowed students to use their social, emotional and cognitive abilities to perform discussion in role. In the Figure, this is identified as the first reflection.

Figure 3-10 Progression towards dealing with conflict: methodological aspects



As part of the first reflection, the results of the pilot study showed that group discussions were by and large difficult to sustain, and many students did not immediately understand what they were supposed to be doing with the task. In school 1 the high number of off-task events did not decrease after the interventions of teacher and researchers. Rather, students' participation increased when they engaged with the task and began to develop a meaningful argument, and found a 'voice' for their character (i.e. Tami: *'How are we meant to make food with no land?'*).

The results of the questionnaires also indicated that students were finding it hard to feel in role, which indicates the need to support students better in developing their ethical understanding, and emotional participation. In the questionnaire, students reported to have enjoyed the simulated debate and the opportunity to listen to other people's points

of view. Overall the data emphasised the challenges that the activity offered to the students: the need to become rapidly familiar with a new topic, and to accommodate other people's perspectives and points of view, along with the development of the skills of discussion, argument and persuasion.

After the adjudication, students felt disappointed by the verdict, and some of them felt angry. In their answers to the first questionnaires, students referred to issues of justice and fairness, and while some characters felt victorious, other characters also expressed legitimate reasons and concerns, and the desire to be heard.

In the second part of the activity, one group of students (Tami and Paul Power) found it hard to perform constructive dialogue, while the other three groups looked for a resolution through mediation. Evidence from the questionnaires suggested that many students felt that the issue had been settled and students expressed a range of ideas for solution. However, students were not always in role. It is difficult to ascertain the extent to which the role-play helped students understand the complexity of the issue, as compared for example to simple discussion activities. More needed to be done to facilitate group work and students' understanding of their characters.

In School 2, the analysis of students' reactions to the role-play indicated that students encountered enormous difficulties with the task. They struggled with group work, found it hard to take on roles and were unsure about the purpose of the activity. In the final questionnaires, a few students seemed to have learnt and remembered something about the issue and the practice of arguing and expressing a point of view, while some students clearly expressed a sense of boredom and disengagement (i.e. 'I learnt nothing'). That being said, the contextual conditions in school 2 were such that no reliable and firm considerations can be made about the methods. Some very tentative speculations can be made about the main factors contributing to the success (or failure) of the activity, such as the quality of the relationships between the students, their familiarity with the contexts of teaching and the presence of a teacher who is able to engage with them, respecting and valuing their contributions. This point will be expanded further in the final Chapter 7, looking at knowledge construction in the classroom.

In summary, the pilot studies provided some important lessons, which helped shape the course of the main study:

- Role-playing did not appear to be as natural as might have been expected. Students in groups faced many challenges, from understanding the issue to organizing themselves as a group and engaging with the complex fabric of a role-performance. They were challenged by the need to develop both linguistic and cognitive abilities, and they did not always use their empathetic side.
- The adjudication was not sufficient to ‘solve’ the issue. Students experienced a situation of conflict and some students felt angry. Students’ dissatisfaction with the model of the Court of Inquiry reiterated the need for students to settle on consensus. However, more support is required for them to take on a role, in order to validate their understanding of the terms of the conflict.
- Throughout the course of the activity, there was evidence of students’ successful participation in the role-play activity and this was not simply linked to having rules and scripts, but was very much a question of how far students managed to work in groups and feel in role, hence motivating one another, thinking together and being creative as a group. This evidence points towards the need for a more in-depth understanding of the group work dynamics that support role-taking.
- Finally, it was important to recognize that role-playing may not be always a success, and that there are differences between classes and schools, all with their complement of less able, less mature and less motivated students. Trying out the activity in at least two different contexts highlighted some of the problems which may arise when doing role-play. In particular in School 2, the importance of the classroom context and the personal abilities of the students emerged very strongly. The conditions of the activity were such that it was not possible for the students to rely on established relationships. In contrast, in School 1, it was at least possible for the teacher to divide students in groups with some knowledge of their attitudes and abilities, and there was sufficient stability in the class for developing the activity. In addition, students with stronger knowledge basis and abilities (such as reading and writing) appeared to engage more easily with the material and make contributions to both the discussions and the reflections on their learning (as found in the questionnaires). In the light of these findings, the main study relied upon a more purposeful selection of the sample and site.

In the course of the pilot-studies, it became clearer that what was being asked of students was also related to a change of their own values, perceptions and beliefs about themselves, their peers, the knowledge they possessed and their belief in their ability to change. This understanding on my side is indicated in Figure 3-10 as the second reflection, which concerned both the role-play methods and the strategies for data collection and analysis.

The analytical framework devised in the course of the pilot study was useful for building an overview of students' performances in the course of the activity. In some cases however, it was necessary to complement the category analysis with qualitative excerpts, which contained more information about the context of the discussions and the interactions between students' conceptions, values and attitudes. This signalled the need for a method for analysis which could identify the emerging patterns in students' interactions, and how the groups progressed in their collective understanding of the issue at hand. As I progressed in the analysis of the pilot study, I became increasingly aware of the limitations of my initial analytical framework and the need to find a strategy which could reveal more of students' abilities to conceptualize the issue, and make links between different aspects, e.g. social and environmental problems, across disciplines and at the local and global level.

What was hoped for was that action in role was captured through different dimensions: social, cognitive, emotional and linguistic dimensions. In particular, the linguistic dimension needed to be visible through the 'narratives' of each character. These were expressed by the students with the use of the first person and also when they tried to make sense of their shared identity as a group – who they were and what they were trying to accomplish, for example:

Boy 1: what is simple life, what does he wanna do...
Girl: everybody, every family can have some land of their own to raise, we are religious people and we do nonviolence...

or how they first stumbled across the point of view of their character and then gradually began to see the issue from his/her point of view (i.e. Dr. Krishna, School 1: *We are Dr. Krishna... and Krishna is not aware of the problems... so what we have to do is to start our argument by saying...*).

Another layer of narrative was also represented by each group's strategy for dealing with the task, which could be captured in the form of little 'storylines' describing the overall progress of the group through each task. One example would be how the groups started on conflict and gradually managed to find their way through the conflict. The strategy of finding 'storylines' for each group can be used to provide accounts of different groups working in parallel during a role-playing activity, and this will be considered in the next section as part of a set of methodological refinements which would capture more precisely the complexity of the role-playing features contained in the data.

3.6 The main study

The nature of this study obliged me to walk into the field 'on the tip of my toes', with no ambition to introduce dramatic innovation, but only aspiring to a change of mood. This included a growing awareness that much of my direct observations would confirm existing knowledge (Flick, 2002, p. 59), and assumptions about how schools should change shifted towards capturing the children's perspectives and attitudes. As a result of reflection, in the main study the aim of the inquiry was better defined as a study of the interrelations between emotional, cognitive and social factors in students' participation in a real issue, and their understanding of conflict. A change of inquiry strategies also followed. Stake (1995) cites von Wright's view of making a distinction between inquiry for making explanations and inquiry for promoting understanding. *Understanding* has a psychological ring which explain has not:

'understanding as a method characteristic of the humanities is a form of empathy or re-creation in the mind of the scholar of the mental atmosphere, the thoughts and feelings and motivations, of the objects of his study...' (Stake, 1995, p. 37)

This was enacted through a search for context-sensitive and interpretive approaches to data analysis, which enabled me to be more sensitive to the perspective of the learners.

3.6.1 Sample and methods

For the main study, a sample of students was selected through contacts with the Principal teacher of biology in School 1. The Principal teacher was approached by

telephone, and he was informed about the research which had taken place in the school the year before. The students were informed of the project beforehand and they were asked to give their consent (see Appendix 1).

The sample consisted of one classroom of students of year 10, which was chosen for the higher level of academic abilities of the students. Although having a class of older students would have been preferable, this sample choice was dictated by practical considerations of classroom availability. Details about the sample are given in Table 3-L.

Table 3-L Participants in the role-play for the main study

N. students	Age	Period	How recruited	Teacher involved	Quid pro quo
1 classroom (22 students)	year 10 (13-14 years old)	june 2003	telephone contact with the Principal teacher	Principal teacher of biology	the activity fits in with the National Curriculum requirements (area: citizenship); the activity is a challenging experience for a classroom of able students

Following the practical considerations derived from the pilot study, the activity was scheduled to fit in a total of 110 minutes, the equivalent of two lessons of 55 minutes each. One important consideration related to the roles played by teacher and researchers. As observed in the pilot, role-play appeared to be new to both teacher and students, and it affected the normal pattern of students/teacher interaction. Because the focus of this thesis was to observe role-play as emerging from students' coordinated activity and engagement, an effort was made to minimise the adults' interventions. This was a controversial decision because it ruled out the possibility for students for example to learn from constructive interaction with the teacher. More discussion about this point will be offered in the final Chapter, using the evidence gathered. For the purpose of this activity, the teacher presented the role-play activity to the students as part of the biology lesson. During the role-play, he contributed to the delivery of the rules of the role-play and the scenario of the controversy. For the remaining parts however, he kept outside the simulation, attending to organisational duties.

Similarly, the researchers made an effort not to interfere with students' work, although I noted my inevitable identification in some occasions with more traditional teaching

roles. Despite my intention to limit the frequency of traditional modes of teacher-led questioning, with initiations and evaluations, those appeared to be necessary in the case of one group in the first lesson. As discussed in the following sections, those particular exchanges between the researcher and the students were analysed as instances of the general pattern of students' participation in school activities established in the classroom. The participation of the teacher and the senior researcher in the role of co-organisers proved to be a valid support during the course of the activity, for making decisions on when it was more appropriate to stop a particular task, or to allow its continuation beyond the available time (for example, the simulation of the Court of Inquiry).

The activity followed the main structure described in Figure 3-1 (page 52), with some modifications made to the role-play materials, as described below.

Stage 1: Discussion in small groups

- Supporting cooperative interaction

An additional set of strategies was introduced for implementing group work and increasing students' leadership. Following the suggestions of the teachers, students were arranged to work in 'friendship groups' of three members, without attempting to keep a balance of genders in the groups. Often the grouping followed the existing layout of the classroom, as the teacher chose to group together students that would have been sharing the same table.

- Changes to the characters' role-cards

Further changes were also made to the role-cards, in order to facilitate students' understanding of their roles. The writing of the role-briefs was changed from the first person ('I am an American entrepreneur...'), to the second person ('you are an American entrepreneur...'). Some simple questions were added at the bottom of the role-card to stimulate students to talk and discuss with their peers and so to facilitate the process of assimilating information. Care was also taken not to increase role-bias and stereotyping. However, problems emerged with one character (Paul Power) and these

will be discussed in the final Chapter 7, as part of a general reflection on empathy. The full set of role-cards used in the main study can be found in Appendix 6.

- Information provided

In order to enhance discussion and prevent disengagement from individual reading, additional information was reduced to a minimum. The language was simplified, and the parts with techno-scientific information were rewritten to suit a non-specialist audience. The information materials which were used in the main study are found in Appendix 5.

Stage 2: Simulation of the Court of Inquiry

No changes were introduced at this stage, except from the fact that the teacher did not take part in the simulation and the adjudicators were given the task of organizing and managing the discussion.

Stage 3: Dealing with conflict

The third stage of the activity was handled by the senior researcher, who acted in the role of teacher. Following the debate, the activity on conflict resolution was preceded by a guided reflection on the negative emotions which may accompany a situation of conflict and the attitudes, which could lead to violence in conflict. During the briefing session, the senior researcher pointed out the broader implications of the issue which would require commitment from both parties to be effectively dealt with, for example the unsolved food and water issues and the need to think how the current problems might apply in future. The use of the phrase *conflict resolution* was intended to present the activity as something that the students could understand and want to happen. Two diagrams which illustrated the general theory of dealing with conflict and an example of the theory applied to the simulated issue were given to the students and described in the course of the briefing session. The senior researcher briefed the students on the practice of dealing with conflict as a path towards transformation¹¹: this consisted of an array of constructive approaches, from compromise to transformation. In the second part of the activity, students were grouped again in larger groups of opposed opinion and for this

¹¹ See diagram in Chapter 6.

task, each mega-group was asked to nominate a secretary that would take notes of the group's discussion on a prepared worksheet (Appendix 8).

3.6.2 The refinement and combination of strategies of inquiry

In line with Van Ments (1999), the focus of the main study was that of guaranteeing that students took on role and kept involved, ensuring the validity of the experience.

However, as the data analysis from the pilot studies had shown, features of role-taking and the general level of involvement of the students were often difficult to ascertain by means of precise categories and boundaries, for much of those features were negotiated in conversation. In order to capture such 'holistic' and qualitative aspects, the main study analysis evolved from categorising single particles of talk to the identification of storylines, made of conversational patterns and contexts, as found in Mercer (2000).

At this second level, analysis was intermediate between conversation and discourse analysis (Potter, 1996, pp. 133). In the first instance, the transcripts were analysed according to the system of categories described in section 3.5.3 in the pilot study, and comprising the epistemic episodes and specific categories of talk. This initial work helped me to become familiar with the content and the nature of the conversation, by providing a broad sketch of the groups' progressions with the task. A second analysis of the transcripts was then conducted to identify the emergence of particular patterns of talk. For example, by focusing on episodes which were identified under the term of 'discussing events', students' talk was further scrutinised for elements of cooperative or competitive interaction and for the ability of students to organise the task, explore the issue and build consensus. An important type of conversational pattern was the 'cumulative talk' (Mercer, 2000), which targeted cooperation in talk and proved useful for making comparisons across the groups. The instances of 'switches' across epistemic episodes were also important to signal changes in focus or the appearance of another speaker. The way in which new voices were integrated within the discussion of the group was also considered to reflect a group's ability to keep focused and expand their thinking.

Alongside the patterns of talk, it was also important to look into the sharing of students' perceptions and knowledge and examine the negotiation of meaning. This was done through the identification of metaphors, examples, evaluations and comparisons used by the students in roles. For example, in the course of the Court of Inquiry, students'

presentations were analysed for the kinds of images they expressed regarding the environment, models of development and images of the future. Additionally, during the activity on conflict resolution, particulars of students' voices, such as hesitations, choice of words and/or repairs, were considered. For example, some evaluative comments would at times trigger controversy or conflict, and being able to identify such instances was important for understanding how students progressed in their discussion task via clarification of meanings. As suggested by Potter (1996), conversations are made of speakers' own interpretation of what is going on and, in most cases, an utterance is based on and displays the sense of the previous turn of talk (Peräkylä, 1996). The work of searching for metaphors and meaning – as well as looking at the general sense of progression for each group – was defined as the building of a narrative, which emerged from the recursive process of describing patterns of interaction and their context, comparing and integrating different cases. This required a careful noting down of my impressions as I moved along each transcript, cross-checking the current notes with other notes from other groups/events, and searching for correspondences with the preliminary level of category system, to develop that level of context sensitivity which allowed me to produce an account of talk between students. In this sense, the voices and actions of the students during the role-play were posed in a rhetorical context through an analytical process, which refrained from excessive manipulation of the data to identify progression and learning.

3.6.3 Transcription

For the main study, more importance was therefore given to the accurate transcription of students' voices. Attention was given for example to the gaps in between, short and long pauses, and special marks were applied in case of utterances in which the speakers wanted to stress or emphasize particular points. In representing students' voices in the transcripts, I have recorded their non-standard grammatical expressions as accurately as possible. Sometimes I added comments on the effects of their accents on the pronunciation of particular words, whenever this could indicate stereotyping of the character's culture (i.e. students sometimes put up an Indian accent). Where students addressed each other by name, the original name was changed or abbreviated with initials in the transcription. In order to make the transcripts more readable, I have added some written punctuation. The discussions were fully transcribed using appropriate conventions (Table 3-M). In addition, where excerpts of students' discussions are used to support analysis and interpretation, these are reported in the text along with a series

of progressive numbers. Such numbers indicate the discussion turns, and are given in the text to allow retrieval from the original transcripts. The turns' number increases as the conversation progressed, hence providing an indirect source of information of the point at which the excerpt was taken (i.e. at the beginning, middle or closure of the conversation). Intervals of talk are also given and noted as intervals between turns, e.g. 45-59.

Table 3-M Transcription conventions

/:	indicates where another <i>speaker</i> interrupts or cuts in.
(overlaps):	indicates simultaneous talk
AAAAA:	a word in upper case indicates loud tone of voice
<u>aaaaa:</u>	an underlined word indicates speaker emphasis
[...]:	indicates a long and discernable pause (generally more than 5 secs).
(...):	indicates a discernable short pause (less than 5 secs).
Comments in italics and parentheses clarify unclear references (e.g. to the worksheets, objects in the classroom etc., words on the tape that are indistinct, e.g. <i>(unclear,</i> or paralinguistic features, e.g. <i>(laughter)</i>).	

3.6.4 Analysis of the questionnaires

The questionnaires were designed to elicit students' feelings during the role-play, and stimulate students' reflections on the opportunities for learning provided by the activity. The same questionnaires devised for School 1 in the pilot study were used in the main study. The analysis was aimed at collecting information on students' reactions to the experience, in order to identify themes which would be triangulated with the findings from the transcripts and the researcher's observations. For example, as further detailed in Chapter 7, an understanding of the nature of the relationships established by the students during their discussions was checked against the nature of their learning, and how far they managed to learn from and about one another. Equally, students' abilities to take on roles were checked against their feelings about the activity recorded in the questionnaires, in order to track students' engagements with the moral and ethical dimensions of their learning.

Some problems arose in relation to keeping track of both the real and simulated identities of the students. In order to track down students' developments during the role-play I made use of a list, provided by the teacher, which contained the students' names with their correspondent simulated character. This made it relatively easy to keep track of each student's performance in the first and second lesson, but in the final set of questionnaires, none of the students signed the questionnaires either with their real or

artificial names. This incident could be put down to lack of clear instructions, and shifted the focus of triangulation from issues of single individuals' performances to a more general evaluation of the learning process.

3.6.5 Ethical issues

This research raised particular issues concerning the role of the researcher, as an outsider and her need to negotiate her role within the classroom, and to build trust between herself, the pupils and the teachers. This became immediately apparent to me as I stepped in the first school for the first time, in the pilot study. During the time I spent in the classroom as an observer, students showed openness towards me, seizing the opportunity to ask for help with their work (School 1 in the pilot study) and referring to me as 'Miss'. There was perhaps an inevitable tendency of the students to identify my role as researcher with that of a teacher. In such conditions, the recording of students' discussions could potentially be considered a 'critical issue', in the sense that students needed to know about how the data were going to be used¹².

In the main study, this problem of ambiguity about the role of the researcher was partially tackled by maintaining distance and a clearer definition of roles and responsibilities. As a researcher, I did not take a teacher's role, with the connotations of power and responsibility that this implies, but I simply acted as the organiser of a one-off activity to which the students were consenting to participate. For the purpose of conducting the research in the main study regular procedures for ethical approval were thus followed. Both parents and students were informed with a letter about the research activity and students were clear about the reasons for using recording equipments. Some tapes actually showed students taking responsibility for the recording (e.g. reminding each other about the taping purpose), and none of the students reported uneasiness at the presence of the tape-recorders. Only 1 student in one group in the main study was distracted by it during the task.

After I received the final questionnaires from the teacher, I no longer had contact with the school and had no further relationship with the classroom. This was mainly caused by different scheduling and the fact that the activity took place at the end of the school year and hence more difficult to fit in with the routine of the school. In this respect, no

¹² One student at the end of the first lesson in the pilot study asked me for a copy of the tape of his group. In the teacher's opinion that might have been under pressure from the parents.

opportunity was given to me for giving feed-back to the actual participants about the activity and the research findings. In Chapter 7 I will come back to this point in a reflection about the limitations of this research and the approach used as part of a wider discussion on the place of this kind of activities in the school curriculum, and the power-relationships of the educational context, which affect and shape the nature of the research in schools.

3.6.6 Summary of planning for the main study

The overall plan for the role-play activity was as follows:

1. Contacts with the teacher and initial briefing (description of previous research experiences, decisions over the classroom sample, presentation of the activity and the materials).
2. Preliminary meeting with the teacher: allocation of duties, formulation of the groups, and delivery of the teacher's briefing pack, arrangements of dates for the role-play activity.
3. Classroom observation during the course of a normal school lesson;
4. Role-play activity: Stage 1 (in lesson 1).

The lesson develops according to the following outline:

- presentation of the rules of the role-play;
 - presentation of the Indian scenario;
 - distribution of role-cards;
 - small group discussions;
 - simulation of the Court of Inquiry.
5. Role-play activity: Stage 2 and 3 (in lesson 2);
 - participants receive their respective role-cards and information sheets from the previous day;

- adjudication and declaration of the verdict;
- questionnaire 1;
- regrouping in larger groups;
- presentation of the activity of conflict resolution;
- large groups' discussions and final presentations;
- questionnaire 2.

6. Administration by the teacher of Questionnaire 3, a month after the experience. The questionnaires are compiled and sent back to the researcher by post.

3.6.7 Overview of data collected in the main study

Table 3-N provides an overview of the whole of the data collected in the main study and students' arrangement in groups:

Table 3-N Data collection in the main study

Stages	Groups	Name of the group	Duration	Other data	number of questionnaires collected
Stage 1	3 boys, 1 girl	Dharwar	11'		
	2 boys, 1 girl	Dr. Krishna	10'		
	2 boys	Jeganatthan	10'		
	2 girls, 1 boy	Margherita	10'		
	2 boys, 1 girl	Paul Power	10'		
	2 boys, 1 girl	Shailesh	10'		
	2 girls, 1 boy	Sonja	10'		
	2 girls, 1 boy	Tami	11'		
	2 boys, 2 girls	Adjudicators	11'		
Stage 2	Tot. students 28	Debate Adjudication	30'	Questionnaire 1 Field-notes Adjudicators' notes	28
Stage 3	3 boys, 2 girls	Power + Jeganatthan + Adjudicator	8'	Questionnaire 2	18
	3 boys, 1 girl	Sonja + Dharwar	4'		
	3 boys, 2 girls	Shailesh + Tami + Adjudicator	8'		
	2 boys, 2 girl	Krishna + Margherita	6'		
	tot. students 18				
Evaluation				Questionnaire 3	20

It can be noted in the table that the number of students participating in the role-play dropped significantly between Stage 2 and Stage 3. This was due to an unexpected overlap in the time-table between the role-play and another extra-curricular event, which involved the whole school (more details later).

3.6.8 Validity

As a first consideration, the research presented here involved only a small sample of classrooms, for which any statistical consideration would be deemed inappropriate. The study could be considered instead as qualitative in nature, and the validation of the findings occurred throughout by means of a number of strategies. Perhaps the term validity of findings itself requires an adjustment. In a situation where the researcher attempted to portray an experience and to give voice to the participants in the role-play, devices for guaranteeing accuracy, authenticity and credibility of the findings were sought (Creswell, 2003). With this in mind, some primary strategies were put in place and implemented to ensure accuracy:

- Use of a collegiate approach, which involved partnership with an experienced researcher and the teacher. The conditions in which the study was carried out did not allow for extended contacts with the schools, which might have compensated for my own lack of teaching experience and my unfamiliarity with the context. However, by being together with other professionals in the class, I watched the events in operation and shared some general reflections on both the events and the data-analysis.
- Triangulation between data collected with different methods at different stages during the activity, e.g. students' comments, the analysis of students' discussions and the observations and narratives identified by the researcher. This provided opportunities for noting internal consistencies between performances of the same student or groups at different stages during the activity and for making cross-comparisons between different sources of data, as suggested by Denzin (1989, reported by Flick, 2002).

The research remained overall qualitative in nature, so enabling comparison between applications of the role-play in different contexts. I also feel I had matured as a researcher, now more able to see the research as a tool for understanding (with a view to

improving) students' learning and understanding. My awareness of problems increased and my interpretation of events changed during the course of this work and was particularly informed by the pilot study. In the main study, I had a greater awareness of my own assumptions and expectations of the research and an increased capacity to perceive and interpret feelings, silences, emotions in the dialogues between the students, as well as more objectively tracking their progress in dealing with conflict through role-play. This led to a corroboration of preliminary findings, and the development of a conceptual framework (Maxwell, 1992) that better informed what was primarily an exploratory and learning experience. In the next Chapters 4, 5 and 6, I will report on the analysis and interpretation of students' discussions as they occurred in the main study.

4. Students discussing their role in small groups

4.1 The task and the focus of the analysis

This chapter analyses students' discussions in small groups, which is Stage 1 of the activity, as was described in Figure 3-1, Chapter 3. Nine groups of students were formed, each one with the task of talking through the reading materials and taking on role. In the following sections, the analysis of students' discussions will focus on three main groups of data: patterns of talk in pairs (Section 4.2), the transition from pairs to teams (Section 4.3) and whole group discussions (Section 4.4). The analysis of each group of data will look at features of consensus building, management of talk and students' conceptual understanding, with some common patterns.

4.2 Talking in pairs

In line with my observations on the day, the transcripts showed that students had made a prompt start on the task. One commonly found pattern of activity was discussion in pairs. The analysis of this kind of dialogical interaction provides evidence of students' style of negotiating power relationships and the building of collaborative thinking.

Example 4-A: Bargaining

This example deals with the sophisticated language moves which are used by a girl pair to negotiate power relationships and decision-making in their group. The focus of the analysis is the ability of the girls to handle disagreement and to progress with communal work:

1st minute of recording:

15. Girl 1: All right great here we go. We are against it.
16. Girl 2: Are you ready?
17. Girl 1: Okay
18. Girl 2: [This is just straight information]
19. Girl 1: [Basically...]
20. (...)
21. Girl 2: [for which we could-]
22. Girl 1: [basically...]
23. Girl 2: shall we write, shall we take notes for what to say?
24. Girl 1: no.
25. Girl 2: Why (...) That is silly
26. Girl 1: No, no it's not
27. Girl 2: We have only got ten minutes right
28. Girl 1: right, Okay

An immediately apparent feature of this dual exchange is the symmetrical structure of the language moves. The girls talked at the same time, each one bringing a specific tone to the conversation. For example, in the beginning utterances (15-16) girl 1 closed the conversation, while girl 2 opened the traffic of talk, signalling that a common task was about to start (*'are you ready?'*). Maybin (1996) described this kind of interaction as characteristic of friendship pairs, with the partners sharing equal power and authority. However, at the start of the discussion, the girls needed to find a way to coordinate their interventions. At 23, girl 2 proposed note-taking as a strategy for managing work together (23: *'shall we write things down?'*), yet the suggestion was not accepted. The reaction of girl 2 (25: *'that is silly'*) showed her disappointment, but the exchange continued, until an appeal to time, at 27, helped the pair to find agreement. Such resolution is important here to signal that the girls were prepared to work together on the task, and establishing some form of consensus conveyed the message that they were making this a priority (i.e. they won't be spending time 'squabbling').

Later episodes in the transcript will show that the girls revisited the issue of note-taking, again displaying some disagreement. The analysis of each of these instances illustrates how they established consensus, and the nature of the collaboration which followed. The first example shows the beginning of the girls' collaborative work:

5th minute of recording:

- 81. Girl 2: [We need to write this down]
- 82. Girl 1: (*the girl continues her talk from the previous turn*) [which meant the devastation to the surrounding areas]
- 83. Girl 1: No we don't because we have got questions; we need to discuss the answers.
- 84. Girl 2: Right you can be the spokesperson then

The excerpt shows the girls involved in two parallel tasks: one is engaged in reading the information sheets (82), while the other one is concerned with task management issues (81). Their disagreement at 83 is in sharp contrast with the intimate chatting of the off-task events, showing that the task is making demands on their relationship, i.e. requiring them to handle power and think together. The excerpt displays the beginnings of this – the girls were both involved and they were operating under a division of roles and responsibilities. Another excerpt from their recording illustrates that the girls eventually were able to integrate their efforts, building a kind of collaborative work in which tasks and roles were negotiated:

6th minute of recording:

109. Girl 2: How are they risky? They are risky because um they...hum, they ehm, there is disease spread from prawns which means that...- How is it risky...?;
110. Girl 1: Because,
111. Boy: -hmm-
112. Girl 1 continues: -okay I will be spokesperson but you will have to tell me
113. Girl 2: All right

Such protracted exchanges of counter-propositions between the two girls resembled the act of bargaining which can take place between two speakers who are linked by a close relationship, engaged in decision-making upon a common interest. In this case, the two girls were linked by a relationship of friendship, each concerned with finding a way to work together. The decision they made in relation to management (112-113) came from being engaged in this communal task: the final proposition of girl 1 at 112, which eventually gained consensus, did not immediately arise in response to the previous elicitation of girl 2 (84), rather it emerged as a deliberation, a response to the lived experience. The analysis suggests a process of learning supported by a climate of friendship and mediated by consensus. Consensus occurred twice, first as a means for bringing the girls together, and aligning their hearts and minds (28), and then later, as a means to put the thinking of the group into operation (112). The exchanges between the girls pointed towards a model of discussion based on power equality and the intention of preserving the relationship.

Example 4-B: control and separation

The following excerpt is an example of failed collaboration between a boy and a girl in the group of Margherita. Although the group featured three members, the transcript did not contain contributions from the second girl (apart from one single word later at 92). Discussion in this group was thus reduced to talk in pairs. At the 6th minute of recording (near the end of the tape), the girl had been reading the information sheets aloud for about 5 minutes:

83. Girl1: (*Mumbling*) Oh look, in the journal reports the decision to close agricultural plants but bla-bla-bla Mr Abraham Faracan of business lines said the institute already invested...
84. Boy: Name is?
85. Girl1: That is actually too groovy. Look! It should be something else, quite, they have found a way to control the pollution. To close the fish farms would be a tragedy for the economy he said (*speaking very fast here with Boy making noises*) over the top activists from Greenpeace (unclear) tragic events are occurring on the face of our country... (*continues to read aloud with meaning unclear*)
86. Boy: This is enough now, I am not understanding a word you are saying.

The excerpt showed two people failing to make shared use of common resources, with the emergence of a power conflict. The boy's outburst of frustration at 86 suggests that until this point there had been little concern for trying to find ways to communicate and to make decisions. The girl prevented others from gaining access to the information, and she also controlled the verbal space that the group needed to share. The scheme '*approaches to conflict*', reported on page 184 in Chapter 6, may be used to compare examples 4-A and 4-B, as two different models for handling power and conflict. In 4-A, the close interaction, and the girls' concern for the common goal preserved their relationship; in the Margherita group, there was no sense of familiarity, there was a display of controlling attitudes, and the resolution that the boy and the girl achieved later on at 89 and 90 actually put emphasis on the preservation of the individual space, with separation of the physical resources. This kind of resolution allowed for the continuation of the task (as the group continued recording), but no further discussion took place. Immediately after the last exchange - which was not fully reported here - the boy added: 92. Boy: '*You two can discuss stuff while I read it*'.

Example 4-C: debating courses of action (battling)

This group was constituted by two boys who would normally sit together at the same table during the classroom lessons¹³. The group was originally designed to include a girl, but she did not attend the first role-play session, hence the transcript provides an extended example of talk in pairs.

As with the girls' conversation in 4-A, the boys engaged in a form of communal talk, using the plural voice ('we', 'us', e.g. 56, 63, 69 and throughout), and their exchanges reflected the boys' equal status (as students and members of the same gender group) and power (they are pals). In particular, discussion unfolds from the equal division of roles and authority in the friendship pairs. The excerpt is interesting in that it illustrates an argumentative pattern of discussion, with expression of opinions and contrasting reasons:

¹³ Boy 2 had a form of physical impairment which affected his speech. During the preliminary visit I noticed that he was using a laptop for taking notes and he had the support of a special needs teacher.

55. Boy 1: it's ...not very good so far... ehm as the ruralnon-violent people, oh! why do we have to be non-violent? If we were violent we could just you know smash up the farms...
56. Boy 2: Yeah but we can't do that. We...[unclear]
57. Boy 1: [well] my suggestion is that (...) uhm we get people to sit down in front of like the transportation units...?
58. Boy 2: Yeah-
59. Boy 1: and-
60. Boy 2: and get killed.
61. (...)
62. Boy 1: No:::
63. Boy 2: Yeah, they would just run over us.
64. Boy 1: No they won't, that's quite – obviously- illegal.
65. Boy 2: yeah, but this is India.
66. Boy 1: What are you saying that India is lawless?
67. Boy 2: No I am not.
68. Boy 1: But India...you sa-
69. Boy 2: but prawn farming is it not illegal? Is there anything you could say. They are gonna run over us

It is interesting to observe in this passage a sense of symmetry between the structure of students' talk and the dynamics of power and control which characterise social opposition and resistance. In this case, a real event, such as the clashes between the local Indian farmers and the 'gundas'¹⁴, was developed by the boys through a battle of oppositions and counter-oppositions in talk. The opposition was well represented by some micro-features of language (e.g. 'yeah...but', at 56 and 65), with some powerful strategies for exerting control: at 58 boy 2 gave an initial agreement which allowed boy 1 to continue his proposition (59: 'and'), but then he suddenly broke into his pal's turn (60. boy 2: 'and get killed'), completing the sentence and managing to win over the talking space. The recorded speech also provided an indication of emotional involvement, particularly from boy 2: later at 74 and 78 he raised his voice; at 75 he is told by boy 1 'to sit down'.

The exchange continued beyond what is reported here, yet featuring a number of examples of this linguistic micro-conflict. For example they use rhetorical strategies such as closed questions ('so what?', at 77), and *adverbs*, (i.e. 'always', at 78), to indicate attitudes of dismissal and closure towards alternative propositions/representations. The violent content of some propositions (i.e. 55, 'smash up the farms'), and the micro-features of language, also gave an indication that the argument was growing in intensity, leading boy 1 to make a strong proposition: i.e. 'we chain ourselves in front of the pumps'.

In terms of language use, we can observe a correspondence between the content of thought and linguistic structures, to gain an indication of students' approaches to conflict. The topic of non-violent opposition generated involvement and action. However, there was a thin line separating the energy of assertiveness (make oneself visible, make one's voice heard), and that of violence (to kill, to smash). In particular, the example showed the novelty of a project for nonviolent action which stretches beyond passive resistance, to seek partnerships and solidarities (for example with consumers in other countries). Perhaps this was difficult for the students to conceptualise by themselves.

From an educational point of view, it was interesting to observe that during their talk, the antagonistic exchanges were accompanied by expressions of familiarity and camaraderie, such as indications of mutual knowledge '*52. I thought you would say that*', and tacit understanding, which does not always require sentences to be expressed in full: '*53. We could just you know....*' Other examples of camaraderie included short jokes (e.g. 109-114), but it is important to notice that this did not lead students to find consensus. Within an environment of friendship, the two boys displayed a competitive attitude towards alternative ideas and a close proximity to conflict.

In sum, the examples presented here gave evidence of students' strategies for power sharing in collaborative interaction. One pattern of activity exemplified by the girls' pair in 4-A, was consistent with a model of inclusive and shared leadership, with an emphasis on finding strategies for working together and sharing responsibilities for the task. In contrast, 4-B and 4-C showed the lack of consensus-building devices, leading to an emphasis on individual performances and the winning of power over 'the other'. Taken altogether, all the examples point towards the existence of mutual influences between models of leadership, language pattern and handling of disagreement. In particular, in a situation of power equality such as interaction in friendship pairs, consensus by compliance is rare. People can agree and work together, or agree to disagree. In the next example 4-D I will look more in detail at the influences of the patterns of relationship on students' conceptual understanding.

¹⁴ As reported by Coppo (2003), the 'gundas' are the armed security guards that the prawn farmers have

Example 4-D: selecting evidence and making a case

The following excerpt contains another exchange in the boys' pair (from the previous example 4-C), in which their discussion changed from a battle of contrasting utterances into some kind of consensual interaction. This passage opens with boy 2 making an appeal to *rational means* (84) to initiate collaborative action within the group:

5th minute of recording:

- 84. Boy 2: We don't know, why don't we find out the structure of our argument..... ehm, ehm: the salt from the prawn farming is entering the soil yeah?
- 85. Boy 1: Yes.
- 86. Boy 2: Meaning that it is degrading the soil and making it impossible to farm,
- 87. Boy 1: yep
- 88. Boy 2: so you can't farm anyway because it is full of water and prawns.
- 89. Boy 1: So the prawn farms are getting salty.
- 90. Boy 2: Well prawns need salt, yes?
- 91. Boy 1: Yes.

The whole exchange developed as a review of the available evidence, which was selected and presented by boy 2 and accepted by boy 1 to form the basis of an argument. This was a particular and sophisticated type of talk, at one time collaborative and non-cooperative. The very existence of the argument was inextricably linked to the approval of boy 1 that by making positive signs, he gave reason to the discussion to continue. However, the numerous and extensive assertions of boy 2, when compared to the monosyllabic interventions of boy 1, conveyed the impression of a solo performance, in which one speaker was holding much of the power and responsibility for what was being said. From a socio-linguistic perspective, this excerpt recalled the talk of a courtroom (Mercer, 2000), '*where a lawyer will commonly seek to persuade the witness to agree to a particular presentation of the information*' (p.89). At the epistemic level each statement by boy 2 could be categorised as an argumentative move or *appeal* (Pontecorvo and Girardet, 1993), and the development of the speech appeared to conform to the boys' model of alternated leadership (in this case each student plays either a passive or an active role). The following excerpt illustrates the use of this argumentative strategy to build the case in support of their character:

End of recording (10th minute):

145. Boy 1: Neither can the Americans [nor Greenpeace].
146. Boy 2: [No, you see] two centuries ago
147. boy 1: yeah
148. Boy 2: ehm, the British government supported the illegal trading of opium because it boosted their economy.
149. Boy 1: Ye:::s, our [government]
150. Boy 2: [Now the] government aren't going to do anything about the prawn farming because the economy is bad, it is very bad so we really have to prove that there are other ways of making money, i.e. by [farming in the traditional way in the long run...]
151. Boy 1: [Yes but intensive prawn farming produces seven times the prawns]
152. Boy 2: Yes but in the long run, yeah?, it does not damage the environment and we can keep going.
they continue talking while the researcher brings discussion to end announcing the start of the second part of the activity
153. Boy1: Yes but it takes seven years to produce what the prawn farmers can produce in a year, so if the prawn farms only work for ten years that is seventy years of the prawns

The excerpt shows that as the students looked into the issue, they gathered information and evidence from a variety of sources. In particular, boy 2 made use of powerful argumentative means, such as appeals to examples, and references to similar issues which had occurred in more familiar contexts (e.g. Britain) to build his case. Through the search of information and a certain level of consent, the boys managed to keep on task and examined a number of aspects related to prawn farming. From a cognitive perspective, this strategy proved useful for reviewing, evaluating and incorporating information. However, the boys did not necessarily take on a role. Boy 2 expressed himself in the first person in a couple of occasions (152), showing active involvement in the task, but boy 1 was not persuaded to join in the taking of a shared perspective.

Example 4-E: pooling of ideas

In contrast to the boys, the girls' pair in the Tami group entered a form of 'duetting', a series of closely connected exchanges recalling the familiar chatting of two close partners that are accustomed to think and act together:

2nd minute of recording:

29. Girl 1: So basically we ...yeah, we could persuade the government that they are very risky because ehm .../
30. Girl 2: Well, (because it offers no protection)
31. Girl 1: (And it makes) the land full of salt, which means that we can't grow anything even after they have gone,
32. Girl 2: okay. So it is basically what that...ehm is? Is what is called cause and effect, they are not thinking in the long run basically
33. Girl 1: Yes because it means that nothing will grow there so eventually their whole land will get covered in it.
34. Girl 2: I think we need to make notes really (...) *noise in the tape-recorder*
35. Girl 1: Okay also, also, also
36. (...)

The excerpt displayed one of the main characteristics of intimate language cooperation: the partners may talk simultaneously, but not in competition for the floor. At the epistemic level, this type of discussion featured argumentative moves (in the form of appeals), which developed out of a cooperative framework, allowing the speakers to cover a number of topics in a short period of time (i.e. 35: *'okay, also, also, also'*). In this context, an open invitation is made to the boy to take part in the task, conveying a sense of cooperative and inclusive attitudes. Additionally, the signs of a common agenda appeared to emerge: as the girls built solidarity, they also took on role (31). It is important to observe the influence of role-taking and cooperative talk on the girls' conceptual understanding of the issue, and – especially striking here – the possibility of combining alternative ways of thinking. For example, the girls juxtaposed the perspective of a local person, i.e. a farmer: 31. *Girl 1: 'we can't grow anything even after they have gone'*, with the general language of science (32. *'What's that...ehm? Is what is called cause and effect ...'*), and this interaction brought to the surface the underlying conflict of human rights. Another interesting element of analysis is the conceptualisation of the concept of risk. Starting from an acknowledgment of the lack of precautionary measures (30. *girl 2: 'it offers no protection'*), the girls moved onto considering other aspects, such as the 'immediacy' and 'irreversibility' of the impacts (31-33). The end result was not so much a deliberation of a definite course of action, but an exploration of the context and the bringing together of facts and value-perspectives.

In sum, the analysis conducted so far on talk in pairs shed light on models of leadership and communication. An argumentative approach characterised the boys' exchanges in 4-D, while the girls in 4-E developed a cumulative and cooperative model. In both models, an environment of friendship was important for sustaining the pairs' relationship and the discussion, and this was conducive to students' engagement with the issue and the task. That being said however, there was a suggestion that the cooperative model appeared better suited to support the pooling together of students' knowledge and interpretations, and opening possibilities for learning as a group. In the next section I will look in more detail at how such an element of sharing can be connected to learning to play a role.

¹⁵ The girl refers to the boy by calling him by his name. I used the two letter J and C to guarantee the boy's anonymity.

4.3 The transition from pairs to teams

An important aspect in the analysis of students' discussions was the transition from pairs to teams, in which the students approached the taking of roles. The following examples illustrate the beginning of this process, with students pooling information and formulating ideas about their characters.

Example 4-F: making a start

In this excerpt, two girls were preparing themselves to take on the role of the Indian prime minister and began to discuss the advantages of prawn farming. The group was constituted by three members, but pairs' interaction accounted for the main body of talk. This example is effective in showing the beginning of role-taking.

1st minute of recording:

- 30. Girl 1: Um okay are there other things connected to prawn farms?
- 31. Girl 2: What do you mean?
- 32. Girl 1: I am sure there are, but I am not quite sure what -
- 33. Girl 2: but what do you mea:::n?
- 34. Girl 1: Um [money]
- 35. Girl 2: [Do you]mean like ...
- 36. Girl 1: [jobs]
- 37. Girl 2: are [they] like jobs
- 38. Girl 1: Um I mean like jobs you know more jobs and stuff but I don't know.
- 39. Girl 2: And you could have like offshoots of the prawn farming industry like
- 40. Girl 1: uhm uhm
- 41. Girl 2: prawns you could have like the manufacturing of the equipment they use.
- 42. Girl 1: ha ha (*supportive sound*). Yes and it will earn India more money like the economy of India.
- 43. Girl 2: And that is what it is all about really.
- 44. Girl 1: Yes basically, we want money um but yes. And India's economy will be better because of it.... probably.
- 45. Girl 2: probably...
- 46. Girl 1: probably, if it works
- 47. Girl 2: I don't know
- 48. Girl 1: if it works
- 49. Girl 2: Well it seems to be working well so far.

This excerpt contains the opening of a constructive discussion, with the two girls engaged in a form of 'think tank talk'. Their thinking was triggered by one of the questions on the role-card (30), which was devised to stimulate the students to think about prawn farming as a larger industry, with numerous and sub-related business activities. It is interesting that the girls opened their talk with a clarification of the question (31, 35, 37), which brought them to focus on a specific aspect and the making of a contribution. By so doing, the girls explored the economic aspects related to prawn farming and began to make a value-proposition which was aligned with the perspective

of their character (44 '*India's economy will be better*'). After the discussion, their talk ended with some sense of satisfaction about prawn farming (49).

It is also striking that this discussion mainly focussed on cognitive aspects, while the biographical aspects of the character, such as feelings, motivations, duties and responsibilities, were somehow overlooked. For instance, they recognised the value of money as the main driving force for their argument, and the same theme will reappear again in their talk (64-74): e.g. 68. Girl 2: '*That is what it is all about: it works and makes money, what more do you want?*', but it did not develop any further. Later episodes in the transcript would also be showing that the students struggled with taking the responsibilities associated with their role (77. Boy: '*Because it messes up all the ground but we can't just sort it out*'). At 80 they switched off their tape-recorder.

This example is useful because it shows the numerous challenges that students had to overcome in order to perform the task. A dimension of friendship and shared leadership was important to begin to feel safe in the character's shoes, and support one another (i.e. 44-49). However other additional elements needed to be included. One was the students' knowledge and understanding of the role (i.e. the civil servant), and the other one was the students' ability to find out about it together, as a group. The lack of engagement of the boy in this group suggests, perhaps, that might have been difficult to do so. The next example 4-G will further illustrate the relationship between group work and role-taking.

Example 4-G: group thinking

Similar to the girls in 4-F, this example shows an episode of group interaction, in which the students tried to answer a question on their card. Discussion in this group accounted for the contribution of all three members, building on each other's move:

5th minute of recording:

- 85. Girl 1: How do you think local people get land of their own to cultivate.
- 86. (...)
- 87. Boy: Get them off the government.
- 88. (...)
- 89. Girl 2: You can't get them off the government because...
- 90. Girl 1: But why should the government do so?
- 91. Girl 2: Because, we don't actually...

92. Boy: There is no point, isn't it¹⁶?
93. Girl 2: They can't.
94. Girl 1: The government won't give us them because the government doesn't care.
95. Girl 2: So it is just like a big cycle (...)

The example above showed the group coming to grips with a difficult question, which required them to make sense of an unfamiliar context (e.g. the Indian land movements), of which they have neither knowledge, nor experience. The intervention made by girl 2 at 95 is a metaphor, which appeared to capture the students' collective understanding of the problem: the girl described poverty as a vicious cycle and her move was very much connected to the talk which went before, resembling a kind of collective deliberation on the new problem. This excerpt is important in providing evidence of a link between style of discussion and students' conceptual understanding of a complex problem (such as poverty).

In addition, the discussion of the students continued to expand and turned into an exploratory type of talk, with contributions from all. The following example shows how the two girls cooperated in finding out options and solutions, i.e. by drawing on their knowledge of other contexts:

96. Girl 1: And because there is less land and I bet their land gets bought up by the prawn farms, because I bet they are really poor-
97. Girl 2: -yeah-
98. Girl 1: - They probably get bought up by the prawn farmers-
99. Girl 2: -They should have like you know like in England, they have like: listed buildings, they should have listed areas (*slows down the speech*), in India, where you can't actually farm prawns...-

As their talk progressed, they also revised their thinking, going back to issues that had been discussed earlier (i.e. the concept of risk):

117. Girl 1: (...it is) risky to people because it means that their land slides (and blah blah)
118. Girl 2: (and also ehm)-
119. Girl 1: - which is dangerous for the people-
120. Girl 2: - and also minim-, minimising hmmm themselves to one single trade, they are not trying and make food (...), India, they are like, they are like ehm focusing all their um money or whatever into prawn farming and after a while that is not going to work::
121. Girl 1: The prawns::?
122. Girl 2: yeah, because there won't be enough land and then what are they going to do because they won't have set up any trade or anything like that.
123. Girl 1: Yes but we don't know what other trade they have, they might have other trades.
124. Boy: well look at that (*referring to the sheet*), there will be a cut in the use of people ... only a sixth are urban people who probably support it.

¹⁶ The boy is of foreign origins and he sometimes makes mistakes in English. In this case the correct usage would be 'is there', as opposed to 'isn't it', which he uses to recall the attention of the group and elicit some form of consensus.

The boy's intervention is especially interesting; it appears to break through the dialogue between the girls, by expanding the spectrum of relevant information to be considered. Within this kind of consensual framework, the group managed to revisit the main arguments of their discussion, gathering ideas and interpretations of events (i.e. 123), and eliciting further contributions.

In sum, this last section of talk in pairs showed the initial attempts of the students to work together and take on role. The analysis of constructive interaction in pairs showed the social, emotional and cognitive challenges involved in the taking of a role. An environment of friendship could support the stepping into a new identity, as shown in 4-F. However, students do not always succeed in taking on a role. Students in 4-G gave evidence of collaborative interaction which can support the creation of shared understanding, with active use of information and interpretation of a new concept or problem. However, here the presentation of two cases reveal that in the analysis conducted so far, no evidence was found of the combined use of all such aspects (information delivering, creativity, interpretation), to produce a character. This may indicate that pairs' talk was a curbed manifestation of the kind of collaborative exchanges required for the task.

4.4 Discussion in groups

In some occasions, students approached the task as a group. In those occurrences, the analysis focused on students' efforts to build a shared identity and reach consensus. I will give examples as follows;

Example 4-H: cooperative action and shared agenda

The following excerpt is concerned with the work of two boys and a girl in the Dr. Krishna group, and illustrates students' shared participation in the task.

First 3 minutes of recording:

27. Girl: (she is reading the information sheets) but yeah I suppose the fact that there are children dying is the most,

28. Boy 1: yeah

29. Girl: main thing.

17. Boy1: yeah, Yeah two million people in one year (reports the information on the card to integrate the girl's comment on children mortality in previous immediately above).

18. **Girl:** Mm. Two million people that is quite a lot and that is because of malnutrition so we need them to eat.
19. **Boy 1:** Yes we need ehm... prawns
20. (...)
 21. **Boy 2:** Ehm poor quality water is a problem which we can't really do much about.
22. **Girl:** Well no[no because ...]
23. **Boy 2:** [listen prawn farming could bring in money, which meant that we could]
24. **Girl:** Yeah so that you could build like [yeah water] system in the village and stuff.
25. **Boy1:** [Yeah water system]
26. **Girl:** so that will be good

A visible feature of talk in this example was the use of the plural voice ('we') throughout, which effectively conveyed the impression of a group of people working towards a common goal (e.g. '*we could*'). The repetitions, and the use of supporting moves throughout ('*yeah*', '*yeah*'), allowed the group to move fast on the task, considering a number of different and relevant aspects in a short period of time. The girl performed the function of both leader and manager, supporting and approving ideas (i.e. 26: '*that will be good*'), or steering the thinking of the group (this was most visible in the exchanges 27-37, which are not reported here). As the students progressed in their task, two main features of this kind of shared thinking emerged. The first example, 'conjecturing', shows the students trying to make sense of the place of scientific knowledge in the controversy:

Example 4-I: conjecturing

9th minute of recording:

137. **Girl:** Yes well I'm, yes, vegetables are good but not that good
138. **Boy 1:** yeah.
139. **Girl:** What vegetables have, like, protein in them?
140. ...]
141. **Boy 1:** No they have fibre or something like that as well
142. **Girl:** Yes but I mean it says here but that um one good, oh Soya beans and other protein rich vegetables.
143. **Boy 1:** ehm
144. **Girl:** what? Ok, so
145. **Boy 1:** Um rain is not ...what is the word?
146. **Girl:** Frequent.
147. **Boy 2:** Yes ...not frequent, not consistent enough.

The second example, the formulation of a 'personal agenda', features students' appeal to a set of beliefs:

Example 4-J: declaration of beliefs

10' minute of recording:

148. Girl: So read this. I mean you heard about water pollution along the coast, I am not really sure what that means really what water pollution is that?
149. [...]: *they are writing things down and looking up info*
150. Boy 2: it's development.
151. Girl: Sorry?
152. Boy 2: It is just better development. That is something we would sort of believe in.
154. Girl: Yeah

The performance of this group is interesting for the central role played by language in the negotiation of social, emotional and conceptual aspects. First of all, the students adopted a cumulative style of interaction, within a model of shared leadership, which shaped their identity of group members. Then they progressed further in discussion, by taking a shared perspective and exploring the sphere of values and beliefs. An intriguing aspect is the ability of the group members to be pernickety about the scientific aspects. For example, they discussed what 'good food' exactly meant in scientific terms (i.e. 137), and the relevance that this could have for their argument. In addition, they framed the specific issue of the protein (explored at 139), within the wider socio-political scenario of the issue (i.e. 152: *it is just better development...*). By so doing, the students displayed active use of their previous knowledge and assimilation of the information, linking knowledge with values and beliefs.

Example 4-K: lack of coordination

This group was made up of three boys and one girl. The boys' interaction constituted the main body of talk, with competitive and unstructured moves, which merged into a chorus of overlapping voices:

78. Girl: Do you think the living conditions of the local people would be better in cities? (*she pronounces the answer herself*) NO.
79. Boy 1: (*the boy immediately follows and he repeats the same answer*) NO
80. Girl: (*the girl stresses the answer*) N[O]
81. Boy 1: [they] will be poorer they would have urban poverty and that, urban poverty
82. Boy2and 3: *yeah*, they will be living like [shantytowns]
83. Boy 1: [urban poverty]
84. Boy 2: [boxes]
85. Boy 3: shantytowns
86. Girl: bad living conditions, No sanitation or clean water (she speaks louder)

In this scenario, the girl tried to manage the discussion by initiating discussion events, summarising and bringing off-task events to a closure. In the last episode of the

transcript, the group is concerned with the planning of their performance, and the strategy they followed was that of dividing the argument in sub-topics, for which each group member would hold responsibility. To this end, the girl pursued an activity of *schooling* of the fourth member, an instance in which she tried out role-taking:

Example 4-L: interpreting the character through empathy

8th minute of recording:

220. Boy3: Isn't this what I say? Hello my name [is Dhar-waar.]

221. Girl: [No, no no no] Just say hello my name is Dharwar I am fifty and ICARE for these people and I am against prawn farming.

(boys are making noises/chatting in the background)

Achieving communal activity in this group was extremely challenging. The relationship of friendship allowed the interaction to continue, but without an established pattern of conversation. In this situation, perspective-taking could not come as a result of internal coordination or consensus. Hence another approach, based on qualities of personal involvement and self-expression emerged:

10th minute of recording:

281. Girl: [and I will say] I am angry because many people are fleeing the villages (...) angry.

282. Boy1: All my cousins have gone away.

283. Girl: all, all my family have gone away.(...) Good.

284. Girl: Because all my family has gone away um (...) this prawn farming is just making us depressed and whenever we get money we just drink and (...) die.

In sum, the analysis of group discussions revealed two tracks to perspective taking: one based on collaborative involvement and shared leadership and the other one based on personal involvement and interpretation.

4.3.1 Examining arguments from a variety of perspectives: the adjudicators

The group of the adjudicators consisted of four members, two girls and two boys, who had been hand-picked by the teacher as students of higher intellectual abilities. In the course of their discussion, they explored different approaches to the task. First, they started with familiarising themselves with the fact-sheets:

7. Girl 1: Shall we go through like the information?

8. (...)

9. Boy 1: Someone read it out aloud.

They spent considerable time listening to somebody reading, but no conclusions were made at the end of it. Subsequently, they moved towards a more collaborative process, in which they pooled together a number of different arguments related to prawn farming:

Example 4-M: pooling of arguments

5th minute of recording:

- 44. Girl 2: So basically...
- 45. Boy1: When you make a prawn farm it makes the ground really salty and ...horrible.
- 46. Girl 2: You can't grow anything in it right?
- 47. Boy 1: Yeah that sort of thing.
- 48. Girl 2: So there is just quite an equal good and bad points!
- 49. Boy1: Yes we have to sort of sway [the other groups]
- 50. Girl 1: [All the bad, are there any good points?]
- 51. Boy2: [Loads of money]
- 52. Girl 1: [lots of trade].
- 53. Boy 1: [basically]
- 54. Girl 2: [And it's food and a high source of protein]
- 55. Boy 1: [Yes.]
- 56. Girl 2: Which I am interested in because [I am the representative] from the food organisation

Through a model of joint activity, the adjudicators collaborated in piecing together some of the main arguments. One striking feature was the use of open questions, which invited other members to make new contributions, as well as closed questions (46), which led the group to agree and build consensus. By so doing the students gathered together what they considered the main pieces of evidence. It is also interesting to observe that the group had been organising such evidence into the two main categories of 'good' and 'bad' aspects, and the presence of consensus seem to indicate that they shared a similar hierarchy of values. For example, at 51, the boy 2 mentions 'money' as being an important aspect. The following example illustrates how this way of thinking shaped the organisation of the hearing procedure:

Example 4-N: deciding on the 'good' and the 'bad'

6th minute of recording:

- 66. Girl 2: Do we have to decide for them?
- 67. Boy1: Yeah we have to decide for all the groups going on. [We are in control yeah].
- 68. Girl 2: [Okay let's just have a look]
- 69. Girl 1: [shall we stay in the order as they are on our sheets?]
- 70. Boy 1: [No because that is all the good ones first]
- 71. Girl2: [Let's do, let's do equally]. Let's do good one, bad one, [good one, bad one.]
- 72. Boy 1: [then good one and bad one]
- 73. (...)

74. Girl 1: Shall we do what?
75. Girl 2: shall we do good one bad one, good one bad [one]
76. Boy 1: [Yep because] that is fair.
77. Girl 2: So just let us...
78. Girl 1: [about four, about eight group]
79. Boy 2: [We need to find out if the prawns- we need to-]
80. Boy 1: [eight groups: 4 good 4 bad] Just do it- (...) What?

The group of the adjudicators was concerned with defining agreed values and procedures, through which they could perform their roles. Rationality and fairness are the two main values shared by the group. However, the group did not spend time spelling out the belief-system according to which they were operating, or for example whether the 'good' and 'bad' points were actually so, or what might have been the possible reservations. Developing awareness of values and assumptions, and taking a critical stance in the course of the hearing, was the expectation as well as the challenge for this group.

A similar work of critical enquiry and construction of meaning is found in the following example, concerned with the way in which the adjudicators tackled ambiguous words, such as 'autonomous', and tried to extract meanings from a variety of perspectives:

Example 4-O: spelling out meaning and values from different perspectives

9th minute of recording:

153. Girl1: What does AUTONOMOUS mean?
154. Boy1: Um autonomous is ... machines doing all the work.
155. Boy 2: Uhm and that guy is saying that all the people are getting drunk and being unemployed and stuff, it is down to them.
156. Girl2: What, he asked the land to be given to the poor people; he wanted a small-scale economy, which should be based on autonomous, what does that mean?
157. Boy1: It means he wants the land to be given to the village and they can use their combine harvesters to do stuff. The difference between the woman who wants the land to the poor, er here-
158. Boy2: Autonomous, It doesn't mean that, it means like the government like control your own affairs and stuff.
159. Girl1: Oh what so like independent?
160. Boy2: Yeah it is like in a...
161. Girl1: Independently?
162. Boy2: Yeah.
163. Girl 1: all right
164. Boy2: So is that exactly the same as what that guy wants, land to be given to the poor and to be autonomous?
165. Boy1: Yeah they want the same thing maybe.
166. Girl1: Okay then.

In this process, students used their own previous knowledge (e.g. from history and geography) to produce conclusions that were contextually relevant. At first, students

confused autonomous with automatism (154), then they explored it in economics (156: *'he wanted a small scale economy'*), and in history/geography (*'it means like the government controls your affairs and stuff'*; *'oh what so like, independent?'*). Eventually students settled for the political definition of autonomous, as independency from the state, and ownership of a piece of land. By so doing, their words communicated two things: one is that the students have interpreted the new situation, using their own knowledge, and the second is that their interpretation was bounded by their own cultural framework. So for example, they interpreted 'autonomous villages' as independent villages, according to a notion of independence which is common in the Western political tradition, but this only partially captures Gandhi's concept of autonomy as self-sufficiency. Again, this example shows the cognitive challenges involved in the task and the novelty of the concept of non-violence.

4.3.2 Teams and conflict

In one group of students, collaboration broke down. The analysis of language in this instance is not concerned with management aspects, but highlights the difficulty of handling a voice of dissent and the missed opportunity for clarification:

Example 4-P: disruption of consensus

The group of Shailesh started on the task with the use of a plural voice:

4. Girl: 'Well basically ehm... we are quite like modern so we are going to like the modern technologies, which can help us with our farming and if it helps us make more profit'.

Yet their activity was disrupted by internal dissent, immediately within the 1st minute of recording:

- 20. Boy2: And we haven't got the other side of the story yet so...
- 21. Girl: Shut up Boy2.
- 22. Boy 1: We have got to go on our side of the story, forget what anyone else said.
- 23. Boy 2: all right
- 24. (...)
- 25. Boy 1: I think that will be best man
- 26. Boy 2: yeah

Dissent was effectively 'suffocated' by the group, as one of the boys is told to shut up (21 -22). The use of definite statements (22), judgements (25), and the choice of metaphors (with references to side-taking practices, i.e. 20), framed the interaction as an

argumentative context, in which there is either a winner or a loser. The consent given by boy 2 at 26 was only apparent, as the discussion was interrupted again later with expressions of sarcasm:

27. Boy 1: If anyone wants to shut our farms I think we will feel pretty unhappy wouldn't we. They are taking the money away from us.
28. (...)
29. Boy 2: I don't think the people who work for us are happy.
30. Girl: Well they are blatantly going to be happy they are making money.
31. Boy 1: We pay them good apparently ...see?, sufficiently for a decent lifestyle, for much of the year their salary is really secure, which is good, I am sure they will like that.
32. (...)
33. Boy 2: Yeah.
34. boy 1: And we have got six children.
35. (...)
36. Boy 2: And they obviously get free prawns.

In this group, the use of sarcasm inevitably disrupted the formation of the team's identity and their shared image. The students kept making use of closed questions (29: '*wouldn't we*') and personal value-judgements (32: '*they are blatantly going to be happy*'), to force the other member of the group to accept ideas and conform to consensus, but at the same time effectively closing down opportunities for dialogue and mutual clarifications. The final proposition marked the end of the group communal work.

To sum up, section 4.3 provided an overview of the analysis of collaborative group work, covering the social and cognitive aspects of communication. The analysis identified two routes to perspective-taking: one route was via shared leadership and consensus, while the other one was through individual self-expression and empathy. Both routes appeared valid means for students' self-expression. It was also observed that not all groups had managed to develop positive relationships and ways of working. Interaction between boys would often be framed within an argumentative/competitive type of interaction (i.e. 4-Q), which could undermine dialogue and clarification.

4.4 Leadership without clout

As a final example, the Paul Power group constituted a critical instance in the analysis of group work. During the role-play, the group showed little communal activity: boy 2 and the girl did some reading of their own with some occasional and limited exchanges, while boy 1 tried to seek attention, making jokes and diverting the attention of his peers

from the task. The example provides an illustration of the students interacting with the researchers and an illustration of a weak students-adult interaction during role-play:

Example 4-Q: interaction with adult

8th minute of discussion:

87. Boy 1: Yes well no one in India wants to live in an early DC (*developing country?*) so the only way to do that is to make money and this is a good way of making money.
88. Girl: you are already making money
89. Boy 1: Not as much as I could do. Paul Power yeah.
90. Researcher: What are you going to say to the adjudicators?
91. Boy 1: It depends on what questions come up.
92. Girl: (*inaudible*)
93. Boy2: I don't think they will go into poverty.
94. Girl: The poorer people will because they haven't got any money any way and they will have to try and...
95. Boy 1: It creates jobs as well
96. Girl: Yes.
97. Boy 2: Yes.
98. Boy 1: And as long as we try and get the right resources into the thing and make better ways and that.
99. Boy 2: And it also means that people are getting more food and protein inside them.
100. Girl: Yes.
101. Boy 2: It is a good thing really.
102. Boy 1: There's not many bad points apart from we will never ban, abandon...¹⁷
103. Researcher: They will ask you for alternatives to reduce the damage and make the farms to work better, how can you explore that point?
104. Boy 1: If we abandon the pond we will fill it with like plants and make it into a nice area.
105. (...)

The example reveals that the students in this group had something to contribute to the discussion: they understood the argument of their character, and made some comments. However, it is important to observe the structure of their discussion. Boy 1 is the first to respond to my inquiry, providing an answer. This reminded me of the first lesson I had observed in this class: boy 1 had attracted my attention as he was very engaged in guessing answers to the teacher's questions. His intervention at 91 is reminiscent of that episode: '*it depends on what questions come up*'.

The excerpt also showed that the other two members of the group joined the discussion at some point, and replied to the comments made by boy 1 (i.e. boy 2 at 93). This exchange reveals that the students in this group had just begun to make sense of the views of the character and were taking a critical stand towards them. In this case, my intervention at 103 turned out to be challenging for them. They did not really work as a group, they felt it was important to make a contribution when asked by an adult, and when presented with a request for justification, they found themselves short of words.

¹⁷ He refers to the practice of abandoning the ponds once they had become unusable.

The comment from boy 1 at 104 closes the interaction conveying a sense of distance from the issue.

What we have got here is a variegated scenario of analysis. Students interacted in pairs or in groups, elaborating particular patterns of communication. These were repeatedly found across the groups to constitute recognisable 'approaches' to the task. In the last example, students did not work as a group at all: the leadership of one of the boys did not carry any weight, as the students did not find themselves in a situation of having built a shared understanding of their character.

4.5 Summary

In this chapter I have shown the characteristics of students' group work, looking at language interactions as a means for mapping out the cognitive and social dynamics of the groups.

The analysis showed that discussion in groups showed both features of pairs' interaction and whole group discussion, hence suggesting that group work was only partially and gradually developed by the students. Progression towards effective group work, with multiple, coordinated and interconnected contributions, was influenced by two main aspects:

- Learning to work as a group (i.e. considering time, making decisions, sharing resources);
- Learning to think as a group (pooling and sharing of information, involving other members of the group, listening to one another, handling disagreement).

In such progression, the building of consensus touched upon management and structural issues (i.e. the sharing of power and authority), and influenced the depth and complexity of students' thinking.

In the analysis of pairs' talk, students' language was framed within an environment of friendship and power equality. Some differences between boys and girls emerged. The girls, such as in 4-A, seemed to practice with a model of inclusive and shared leadership, while the boys (i.e. 4-C) tended to adopt a more competitive and argumentative style, although still in ways that reflected their relationships. In one case,

students appeared completely removed from the habit of group work and discussion broke down (4-B).

At the cognitive level, the observation of micro-interactions throughout the activity produced evidence of both conceptual and epistemic progression in students' understanding of the complexity of the issue. For example:

- a) Use of descriptive approaches to seize out similar processes in different disciplinary realms (e.g. in the Jeganatthan group, at 148);
- b) consideration of different time-scales: e.g. Jeganatthan 152 '*in the long run it does not damage the environment and we can keep going*'; Tami '*we can't grow anything even after they have gone*'),
- c) Use of examples and metaphors to describe processes of linear and circular causality between the various aspects of prawn farming (Tami 95 '*it is just like a big cycle*');)
- d) Consideration of alternative frames of thinking and perspectives (e.g. scientific narratives versus folk narratives, Tami 32; Adjudicators: 157, 158, on the clarification of the word *autonomus*). In one case (the Dharwar group), a girl student used perspective-taking and imagination to infer knowledge about their character (e.g. Dharwar 281: '*I am angry because many people are fleeing the villages, angry*').

Finally, the analysis identified two routes to perspective-taking: one route was via shared leadership and consensus, while the other one was through individual self-expression, and empathy. In both cases, an environment of friendship could support the stepping into a new identity and be effective in role-playing. In addition, both the argumentative and cumulative patterns of talk were well suited for gathering information, although collaborative interaction and shared understanding were better suited to support the interpretation of new concepts and problems.

Negative cases in the analysis showed that not all groups had managed to develop positive relationships and ways of working. Groups perform better than individuals depending on the level of emotional intelligence, in other words their ability to get engaged, keep momentum and deal with negative emotions. In this respect, the data showed a tendency to 'solve' conflict, for example by using language to suffocate

disagreement through judgements, or by breaking their relationships. In non-friendship pairs (such as 4-B, 4-R), the relationship broke down very quickly and did not lead to the building of a group: students adopted a model of leadership which placed emphasis on individual performances, and the winning of power over 'the other'. In other cases it seemed that the groups had not developed a model for working together (as in 4.4).

In sum, this chapter showed that the students approached the task by means of a variety of different approaches and they were confronted with the complexity of taking on a role. The final discussion in Chapter 7 will revisit such findings as a context for reflection on the implications of this kind of activities for science education and classroom practices.

5. Performance and adjudication

5.1 Introduction

This chapter focuses on students' discussions during Stage 2 of the activity (see Figure 3-1), and is therefore primarily concerned with the adjudication. The first part of this chapter analyses students' presentations of themselves in role, by looking at knowledge, values and beliefs that students made explicit through their choice of language, topics and justifications. The second part looks at students' reactions to the activity, recorded by responses to the first set of questionnaires.

5.2 Role-performance in the context of the Court of Inquiry

At the end of the group discussions, the adjudicators formally opened the discussion and gave the instructions to the groups. For each exchange, there was a time allocation of two minutes, and the analysis followed the natural succession of the interventions. As the interaction with the adjudicators progressed, I had the feeling that students were much more able to present themselves in role compared to the pilot study. They did not read the cards, and quite often they were able to express complex ideas in a personal manner. Important elements of the analysis were the use of metaphors, the making of judgments and the expression of value-assumptions, as they 'got inside the skin of their character'.

5-A: Sonja Rey and the performance of an institutionalized role

The adjudicators invited the characters to make their presentations by following their prepared worksheet (see Appendix 4). The first character to make a presentation was an ex-official from the Indian Government:

6. **Sonja (girl 1):** So basically we are an old woman who has lived in India all her life, and we are sixty years old, and um we are devoted to the development of India so we want the economy of India to be better. So we are pro prawn farming because um, it brings money into our country and we want our lives, uhm, living conditions of the people to be a lot better (pause), and we believe that this will bring in from the western countries, it will bring foreign currency and so yeah.
7. **Sonja (boy):** *(Whispered)* Natalie has started with a strong point.
8. **Audience:** *clapping.*

In the excerpt, the character made a presentation which was based on specific justifications and goals, as stated in the role-cards:

Social role: Government Officer (country's representative).

Justification: the Government has the country's best interests at heart.

Goals: growth of the country's economy through the generation of revenues.

The presentation won the approval of the audience, yet when questioned by the adjudicators, the group failed to sustain the official front:

9. Priscilla: do you want, shall we ask questions? What do you think of the bad points?
10. Sonja (girl 1): we don't know
11. Audience: *laughter*
12. Adjudicator (boy): But what are the bad points?
13. Sonja (boy): We are not very educated on the bad points.
14. Sonja (girl 2): We are just all for the money really.
15. Sonja (boy): We are confident that any technology um can tackle any problems that arise.
16. Sonja (girl 2): yeah
17. Sonja (girl 1): Yes and it doesn't say anything about the mangrove trees so we don't know whether we care for them or not so...

While the adjudicators addressed some critical questions about the validity of what was said, the group's answer generated laughter in the audience, almost as if the character had failed to demonstrate the social responsibility that was expected of her role. Indeed the group's appeal to the technological 'fix' came across as a shift of responsibility, from the Government to the scientists and technologists. The excerpt also seems to confirm previous observations about the link between quality of group interaction and ability to construct a coherent point of view, or 'front' for the team. In this case, the character's denial of responsibility was followed by disengagement of the team members, with a subsequent 'loss of face'. At turns 15, 16 and 17 the students seem to have withdrawn from the argument, making their character lose credibility. The exchange between the adjudicators and the team continued, opening a new area for discussion:

19. Dr. Goshivah (girl 2): And also do you think that the prawns industry has made a difference to your health?
20. Sonja (boy): I have eaten lots of prawns in my salad last week (*audience: laughter*). I feel a better person for it.
21. Priscilla: do you think it has improved your health, like your skin, like your general body?
22. Sonja (boy): Yes I feel much better because of the prawns.
23. (...)
24. Sonja (girl 1): no, I don't think it has really affected us in our complexion or anything.

In the exchange, it appears that students were grappling with the concept of well-being, at two levels: on the one hand there is the well-being of a country measured through parameters of economic growth; on the other hand there is the well-being/health of the individuals. For example, Priscilla, 21, makes a reference to health, as ‘the skin, the general body’, but this qualitative aspect escaped the understanding of the Sonja group, who had mainly looked at arguments based on growth of capital revenues from the prawn farming. Indeed ‘health’ became a recurrent theme throughout the debate and constituted the main grounds for discussion upon the paradoxes and ambiguity of the prawn farming issue.

5-B: Tami and the perspective of a local villager

Girl 1 acted as a spokesperson for the team. Her presentation started with a long and articulate introduction, in which she summarised the group’s previous discussion. The girl presented herself in character as follows:

Social role: representative of the movement for the land in the Tamil Nadu region.

Justifications: the prawn farming is leading the local people into poverty.

Goals: to ensure the well-being of the villagers (to gain land for the poor).

The girl’s argument was two-folded and addressed issues of human rights:

Survival rights, which are dependent on availability of and access to natural resources:

2nd minute of recording

30. Tami (girl 1): [...] we have seen it destroy our land and take away the land from the villages [...], which means [...] they can’t grow any crops.

Protection rights, which are linked to Nature’s services to people survival:

(continued from turn 30):

Um and um ...we.. .also, um, we also think um well there was a cyclone in ninety-three which meant there were lots and lots of floods because the mangrove trees that kept the soil inside the coast got chopped down which meant that the land would flood and um there were like landslides and people couldn’t find shelter in the mangrove trees um.

The initial presentation showed the complex pattern of reasoning which took place in the group. The girl took on role although her speech was punctuated by pauses and a

little laughter, denoting, perhaps, some tension. There is also an imprecise referral to land-slides, which are a more likely event in British geography than in the Indian region. However, after this initial introduction the team's presentation achieved momentum: the girls engaged with a tight exchange of contributions, in accordance with their familiar style of cumulative talk (31-37). In this kind of 'double act', girl 1 provided specific examples, in the form of accounts and instances, while girl 2 summarised and conceptualised:

31. **Tami (girl 2):** We basically think the government is overlooking um its people in order to get money and that is not fair.
32. **Tami (girl 1):** Yeah. And also the land that the prawn farming is using um can't be used afterwards because it becomes full of poisons which means [that...]
33. **Tami (girl 2):** [Which is] also like a risk to our health as[well].

At turns 40-43 there is a combination of cooperative and advocacy styles as the girls acknowledged both sides of the argument:

2nd-3rd minute of recording

40. **Priscilla:** Are there any benefits? **Adjudicator (boy):** Do you think it helps you at all?
41. **Tami (girl 1):** it makes India richer
42. **Tami (girl 2):** it makes it [but]
43. **Tami (girl 1):** [but] on the other hand it is not a permanent solution.

Evidence from the adjudicators' notes showed that this particular form of talk, in which the two girls shared the leadership, was effective in granting the character trustworthiness, for the girls appeared to *know* the issue, as well as adding new dimensions to the debate. In particular, the concept of 'health' is described as a function of the quality of the environment. One of the messages which seemed to come across from the girls' arguments (i.e. 30) was that in the subsistence economy such as that of the villages, an interference with Nature's processes has immediate effects on the local human communities. From this a number of other implications followed:

- **Risk and indeterminacy:** in the girls' presentation, the natural environment seems not to be separated from the life of human communities, and in this view there is no possibility of weighing up the irreversible damage against the estimated benefits, albeit large, that can be derived from the farms' revenues.
- **Unfairness:** the benefits as well as the cost of the prawn farming industry are unequally distributed.

- Injustice: the girls' speech seemed to contain an implicit rhetorical question: *what do we do when the prawn farming is over?* In this view the irreversible damage created by the prawn farms is seen as a form of injustice, because it also prevents other forms of economic activity and ways of life to take place. By so doing, the prawn farming industry would feed a positive cycle of poverty and destruction (34-36).

The girls' front appeared to be coherent and consistent as they built up solidarity in their group. This was also visible in the sense of loyalty and commitment to their group's own ideas and choices of behaviour:

3rd minute of recording:

- 51. Priscilla: Do you find it hard to afford the prawns?
- 52. Tami (girl 2): We don't eat them because we are against it.
- 53. Priscilla: so it is protest
- 54. Tami (girl 1): Because we are against the prawn farming that is why we won't support it, yes.

Alongside responsibility, the excerpt also revealed the link between consistency in performing one's role and credibility, ability to express oneself and to declare the matters at stake.

5-C: Shailesh and the performance of an interest group

The performance of the Tami group had revealed a clear-cut division between the perspective of the Indian Government and that of the local villagers of the Southern State of Tamil Nadu. At this point, the performance of the Shailesh group, a local entrepreneur, added more complexity to the debate. Shailesh was a local, yet his interests were better served by the Government and other corporate businesses. The group's presentation relied upon the collaborative effort of two members of the group, who structured the argument on the character's legitimate effort to pursue personal goals, such as a comfortable family life and career:

4th minute of recording:

- 60. Shailesh (girl): Yeah and also we have invested all our money into this project and um we are having really good profits, um we employ lots of happy people and they have got a better lifestyle.

The character's presentation was framed within a utilitarian framework, where fairness was expressed in monetary terms (wages) and the benefits were conceptualised as material wealth. Within such framework, to deny people the opportunity to increase material well-being was considered a form of selfishness:

62. Shailesh (girl): And um we think it is a bit selfish for people to say that we shouldn't be prawning farms because ehm...

63. Adjudicator: Farming prawns.

64. Shailesh (girl): Farming prawning no farming prawns (*laughter*) because um it is bringing money into our country, which is really well, which is needed.

The sustained interaction between the group and the adjudicator led to the manifestation of a *contradiction*. While the group argued for the pursuit of personal interests and profit, the question of one of the adjudicators: 68. Priscilla: *Have you got an example of a specific thing to help?*, confronted the character with another concept, *helping*, which holds an immaterial value. A conflict would then be embedded within different purposes and lines of action. The Shailesh's group dealt with such contradiction by means of a competitive/adversarial strategy, aimed at adding value to their argument through devaluation of the other party:

5th – 6th minute of recording:

70. Shailesh (girl): Yes just local villages, we like, see there is nothing, because they can't employ loads of workers for their land, so they come and work for us.

However, this did not prove to be a satisfactory explanation for the adjudicators, who inquired about the group's ethics of responsibility:

73. Adjudicator (boy 1): What about what happens after you have finished farming? Like all the salt in the soil and stuff?

74. Shailesh (boy 1): Leave someone else to clear it up. (*Laughters*)

75. Shailesh (girl): No, no the thing is when we build our modern technology we will be able to get over that problem.

As with the government's officer, they were unable to provide a satisfactory answer, which generated hilarity in the audience (74). Subsequently they backed up their argument by making an appeal to the technological fix, and continued to play their role by trying to minimise the risk of prawn farming:

79. Dr. Goshivah: So do your children live in India.

80. Shailesh (girl and boy 1): Yep.

81. Dr. Goshivah: do you feed them prawns?

82. Shailesh (boy 3): Of course!
83. Shailesh (girl and boy 1): basically, yeah.
84. Dr. Goshivah: Do you think it makes a difference to their health? How?
85. Shailesh (girl): Yes they are a lot more healthy.
86. Shailesh (boy 1): It builds strong bones ...
87. Shailesh (girl): better complexion (*kind of joking, refers back to Sonja*).
88. Shailesh (boy 1): yeah whatever they are clever.

While the language in the exchange seems to suggest a degree of embarrassment and distance from the role, the adjudicators kept noting down what was being said and the talk kept the audience interested. Arguably, the presentation of Shailesh at this point played a strategic part in the debate: it reinforced the previous argument of the government's officer, and it distanced itself from issues of risk and uncertainty that were previously addressed by the Tami group. In this sense this exchange was revealing in that it showed some similarity between the prawn farming simulated debate and other food-centred controversial issues (i.e. mad cow diseases, the salmon farming issue), in which the recommendations on safety made by Governments and governmental bodies were indeed aimed at minimising risk and overriding issues of uncertainty, or ignorance (Harremoës, *et al.* 2003). I will return to this point later in Chapter 7 about learning through issues.

5-D: Margherita and the point of view of biology

Girl 1 opened the presentation with a short introduction which was followed by a series of exchanges with the boy. It is interesting to note that this group did not manage to effectively carry out cooperative work during the preliminary activity (opting for individual reading in the end). However, throughout their presentation they displayed a good amount of detailed knowledge on the issue. The classroom kept completely silent during the group's performance and the adjudicators' notes also confirmed that the group satisfied their expectations of the role of a scientific 'expert'. In sum, the main points of the presentation were:

Social role: biologist

Justifications: the prawn farming interferes with life in the ecosystem, which needs to be preserved.

Goals: to explain the complex web of relationships within the mangrove swamps in order to persuade the adjudicators of the environmental and social damage inflicted by the prawn farming.

In line with their role and by talking in the first person, the group provided a description of the ecosystem, by naming its inhabitants and their relationships and explaining how these had been destroyed by the introduction of prawn farming:

6th minute of recording:

92. Margherita (girl 1): ...basically it is a lot of problems for animals like even birds because the mangroves trees are being cut down and they provided a really good environment for those...

The girl began her presentation by giving an account of a three-dimensional space, where relationships of causality extended from the sea to the land and the sky. The expression 'even birds' came across as an element of surprise and it was effective as a means for revealing ecological relationships which had been overlooked so far. The presentation progressed as a linear reasoning which linked together ecological and economical aspects:

continues from 93. Girl: ...also it is injuring humans in one way because fishermen, because their jobs, are like just being just deteriorating because the fish are dying.

The boy continued the argument presenting his conceptualisation of the food chain (as he expressed it during the group work) through the use of 'common' language:

93. Margherita (boy): And also wild prawns, that aren't made through these high tech farms, they are dying out because the mangrove trees are being cut down , which means that there will be a missing link in the food chain, which means that some other fish or whatever might get hungry and so might die. Yes.

The boy's contribution effectively clarified the girl's previous argument. Without making appeals to the authority of the book or the documents, he used his own scientific knowledge to build an argument: the disappearance of wild fish impacted upon a larger system which included the local human communities and the prawn farms. This element of in-dwelling of human communities and ecosystems was more strongly revealed in response to a question from the adjudicators:

8th minute of recording:

104. Priscilla: Do you think that ehm although it is sad for the animals um it is making Indian people healthier, so India needs more prawns?
105. Margherita (boy): Well no because a lot of people are being hindered by it because of jobs and because of water, I mean there is a water shortage in India anyway and they are pumping water into it so in a way it can make it more unhealthy.
106. Margherita (girl): And also there is less of the other stuff they need like fish.

The boy's answer fitted in with the broader discourse of health reported in 5-B. At this stage in the debate however, such argument had acquired stronger impact: following Shailesh's presentation, Margherita's argument could include in the same picture the local entrepreneurs, of whom none of the earlier speakers had considered. By such means, Margherita's presentation contributed to focus the debate on the *communality* between people living in the same environment: e.g. the issue of water scarcity reported at 105 was linked to a discourse of health and well-being, an important aspect for all. While this event signposted the need to find new, creative solutions which were advantageous for both parties, the group was unable to answer the final question of the adjudicator who asked about possible alternatives to prawn farming. The group was unable to reply and they used their foreign identity to *step back* from the debate.

5-E: Paul Power and the presentation of conflicting evidence

Boy 1 started the presentation of the Paul Power group. This was quite unexpected as boy 1 did not engage with the role-taking activity during the group discussions and he communicated unease with the task and the character. But when the group was asked to speak, he presented the character by taking on role. In the initial statements, boy 1 declared the character's justifications. The presentation was then continued by boy 2, who expressed the team's goals (i.e. the profit):

9th minute of recording:

122. Paul Power (boy 2): Yes, we think that prawn farming is really good because it can seriously boost India's economy, because it is such a good environment for them to grow and we can make lots of and quickly more of big dollars ehm them, yeah so, and also feed the people of the small villages around, so they have a better and healthier lifestyle. So maybe they can farm and also (*unclear*) things, like rice. It will probably work out a lot easier... in general.

The main points of the presentation are summarised as follows:

Social role: American entrepreneur.

Justifications: India is poor and it needs to develop through industry.

Goals : to make better profit out of the International free-market.

The presentation of this group showed the boys' deliberate attempt to respond to previous presentations on issues of food, making use of speech moves to serve the

purpose of a strategy of power alignment. In the excerpt presented above, Boy 2 linked his presentation to that of the Shailesh's group, by repeating the same words ('so they have a better and healthier lifestyle'). By so doing, he somehow reinforced his position before the adjudicators, by pulling also Shailesh's reasons and interests into his own argument. The Paul Power group was aligning with the goal of persuading the audience of the general overall benefits of prawn farming ('*It will probably work out a lot easier... in general*'). However, when they tried to provide justifications on issues of responsibility, they appeared uneasy:

125. Paul Power (boy 2): ehm, ehm....[...]

126. Long pause

127. The members are whispering and consulting each other.

128. Paul Power (boy 2): ehm one more point.

129. Paul Power (girl): ehm we have more things to say

130. Paul Power (boy 2): ehm, ehm, well when the thing is like finished we will make the area nice again, we will plant things, trees...

The second part of their performance showed a degree of self-consciousness. This was visible in the number of hesitations but also in the content of their speech: at 130, the boy backs down from the interaction, by taking an oversimplified position towards the issue of the environment and rights. It is noticeable that prior to this point, the adjudicators only ever asked simple, direct questions, whereas now, after they had listened to a number of different contributions, they tried to formulate more articulated questions:

138. Priscilla: you said, Paula, you have got jobs for the poor but ehm there isn't, you are taking away more, you are taking away the land from the poor and none of the poor have their own land to farm on, and also, there isn't enough prawns, or is there? (*unclear, incomprehensible because the adjudicator is mumbling*)... and what else are you going to do?

The structure of the question suggests that the adjudicators had started to approach the mental stage of deliberation, in which they assessed one side of the issue and then the other (Billig, 1987). This preliminary attempt to summarize also suggested that the adjudicators were listening to the delegates and they were open to being persuaded by them. The question of the adjudicator displayed the desire for some form of clarification of the contradictions that had emerged from the discussion: the business of prawn farming appeared to be non-sensical, depriving the farmers of the land and the opportunity to grow food in order to create jobs and sell the food product. Surprisingly, the group replied with confidence to the question, through a set of supportive moves:

11th minute of recording:

139. Power (boy 2 and girl): no they still have land, we are not actually taking... in our schemes thing we are not taking that much land.

140. Power (boy 2): yeah, we are not taking everyone's and they can get like other jobs.

142. Power (girl): and they are getting more money with the prawn farms than they would be without it.

143. Power (boy 2): and a lot of the land that we are taking is not used for farming anyway, because it has been disregarded, because it would have been too much work for the farmers.

The excerpts of dialogue from this group made it apparent that by taking on the role of the entrepreneur, boy 2 adopted a particular perspective which gave value to what was accountable in monetary terms, and considered the land which was not used for farming purposes as 'disregarded'.

5-F: Jeganatthan and the appeal to fundamental principles

Heading towards the end of the discussion, Jeganatthan was the sixth delegate called to speak. Here are the main points expressed by the group:

Social role: leader of the land movement.

Justifications: prawn farming is an issue of unfairness.

Goals: to abolish the prawn farming business, to redistribute the land.

Boy 2 performed his role through an appeal to condition, which framed the issue within a discourse of abuse of power and unfairness:

12th minute of discussion:

147. Jeganatthan (boy 2): We are a league of non-violent movement against prawn farmers, and we are against it because it is unfair to the poor population of India, Southern India.

During their performance, the Jeganatthan group declared that the prawns were produced for export, but the local people were suffering from the environmental impact (the 'cost') of their production:

149. Jeganatthan (boy 2): Taking away land of poor to be used for prawn farming which in no way benefits ehm the poor people because all the prawns that are produced are exported to the Western world and um we people of India can't afford those prawns, and also it cannot be supported for a long time because it is being infected by disease. This means that afterwards the land cannot be used for farming because also the salt from the prawn farms gets into the soil and infects it, endangering agriculture.

At this point in the debate, it was possible to perceive a rising climate of opposition. At 150, boy 1 *disclosed* a piece of information, the declaration of the Supreme Court:

150. Jeganatthan (boy 1): I would also like to point out that um these plants should actually have been closed by March nineteen ninety-seven which the Indian supreme courts ruled they should have been closed, which obviously they haven't, so it is obvious the Americans and whoever are disrespecting the law, which you know it should have been closed.

151. Power (boy 2): *makes a comment in the tape-recorder*: 'objection please'.

In line with the same strategy the boys had rehearsed during the small group discussions, the contributions of the Jeganatthan group aimed at constructing a case for truth, in which they would recognize the persons at fault. Jeganatthan (boy 1) effectively conveyed a legal view of justice which, in its simplest terms, equated to the act of respecting the law and paying for misdoings. At the heart of this view of justice there is a concept of dependency from and referral to an authority. The contribution by Jeganatthan (boy 2), at 137 (not in the text), made this concept explicit: 137. Jeganatthan (boy 2): *'It is in there, the Indian Supreme Court ruled'*. At this point (12 mins) the debate took an increasingly adversarial tone. The adjudicators asked the Jeganatthan group to offer a constructive proposition for solving the main problem of salt in the soil:

153. Adjudicator (boy): Have you got any suggestions about the salt? Is there any way to get rid of it?

154. Jeganatthan (boy 2): Not as far as we know.

155. Adjudicator: *inaudible*

156. Jeganatthan (boy 1): yeah, but I suppose if they used lots of water it could get away but that is a scarce resource which we cannot waste.

157. Jeganatthan (boy 2): Yes but I forgot to say prawn farms use up loads of fresh water which is a scarce resource and is needed for local people to drink and so on.

The students managed to respond to the adjudicator's question and to provide an explanation, but they were insecure in their roles (156-157). As with the Paul Power group, after a brief period of being lost for words (154) they produced a joint, multiple authors' argument. The first answer by boy 1 was carefully orchestrated in the form of a concession (156: I suppose... if) which was then followed by a counter-argument and a dismissal. The boy spoke in the third person (they used) and he conveyed a perception of nature as a collection of resources which were perceived as naturally scarce. Likewise, the contribution by boy 2 opened with the same semantic structure (yes... but...) and reinforced the concept of scarcity with the intention of blaming the prawn farmers for making things worse. The contribution of boy 2 at 157 added to previous appeals to issues of human rights, by emphasizing human fundamental needs for fresh

water and food. This apparent appeal to an alienable principle sharpened the conflict, and phrased it as a competition between needs and interests over scarce resources. In this framework, there could only be a winner and loser, as the linguistic strategies of the boys also suggested: the 'yes...but' structure was used for building analytical and selective reasoning, aimed at finding a solution by closing off the path to other alternatives. In such a context, the contribution of the Jeganatthan boys can be used as an opportunity for reflecting on students' understanding of the concept of fairness, and perhaps on the missed opportunity for expanding on the meaning of this concept. Arguably, the setting of the Court of Inquiry as it developed so far invited some students to take on an argumentative and competitive stance. In this context, fairness appeared to be defined as an equal distribution of resources between different interest groups. This view is however quite different from another possible interpretation of the same concept, that of justice as equity, which accounts for the relationship of the human beings with other living communities. Such a view might have been developed from previous accounts given for example by Margherita, in the context of biology, but up until now, there was no evidence which could indicate that students were aware of this alternative concept.

5-G: Dr. Krishna and the social concerns of a professional

After the first opening statement by the Dr. Krishna group, the bell rang. Nobody in the audience moved: evidence from the video shows that the classroom was permeated by an atmosphere of engaged attention as the students waited for the performance of the next speaker. In his presentation, Dr. Krishna presented his concerns for the Indian population:

Social role: retired Doctor, with a Western education.

Justifications: experience of poverty in the past, wants to get better things for the future.

Goals: to promote prawn farming in order to guarantee food all year round.

Through an alternate exchange of partially overlapping moves between boy 1 and the girl (163-164), the group declared to have witnessed the problems of famine in India. Boy 1 stressed that they had studied in the West, and from this position the group made a recommendation for India:

14th minute of recording:

165. Doctor Krishna (girl): Yes um we seriously think that prawn farming should go on because it offers a good source of protein for people that they desperately need for major malnutrition, and the local children are still dying from it.

166. Doctor Krishna (boy 1): We feel that prawns are an easier way of us getting protein. The old way with vegetables really is not enough way, because if the rain fails the whole country just misses out, just misses out a good source of food. So we feel that prawns are just the easy way of getting protein.

Their presentation aimed at conveying the image of a doctor with the country's best interests at heart. Yet the cumulative exchange between the boy and the girl dramatically dismissed all previous arguments from the local villagers (i.e. the return to local agriculture). Another observation concerns the narrow focus on prawns and their nutritional characteristics. The views of the doctor seem to originate from a concept of health which results from single interventions, i.e. more protein, as opposed to the idea of health as a 'condition', which includes an entire network of social and natural services. The adjudicator at this point was quick in bringing up the issue of water:

169. Dr. Goshivah: so you feel that protein is important for life, so do you have any comment on the lack of fresh water because of the prawn farming.

The series of exchanges between the group and the adjudicators, after 169, showed the weakening and breakdown of the argument of Dr. Krishna:

170. Doctor Krishna (girl): yes we do. This prawn farming industry brings money in to the country and this means that the government would have more money to buy things.

171. Dr. Goshivah: The local people can't afford the prawns, so how can they do so. It is not really of benefit to them. And also how sure can you be that the money will be used to provide better education for the country?

172. Priscilla: (links in with the Doctor) They might just put it into other bigger businesses than prawn farms.

Towards the end of the debate, the adjudicators' emerging understanding of the issue became apparent. However, no further exchanges took place. After Dr. Krishna's presentation the debate was rapidly brought to closure by the researcher, announcing the continuation of the debate at the next lesson (total duration of the debate: 16 minutes).

5-H: Dharwar and the authority of a head villager

At the start of the second lesson, the Dharwar group made the last presentation. On their arrival in the class, the members of the Dharwar group showed me a newspaper article from the Guardian: on the same day of the role-play activity the Guardian released a

special feature article on prawn farming (Lawrence, 2003)! The debate started without delay: the audience was silent and ready to listen to the last presentation.

The group of Dharwar was constituted by the three boys, with the absence of the girl¹⁸ whom, in the previous small group discussion activity had performed the role of a coordinator. The main part of the presentation was entirely carried out by boy 1: he opened the presentation by making a declaration of disagreement which was then followed by a long series of appeals to the consequences and justifications, ending with a final evaluative statement:

180. Dharwar (boy 1): And we are against prawn farming because it is destroying the ecosystems of our areas and it means that villagers can no longer go and forage and stuff; and you know, get stuff. And after a few years they just abandon the prawn farms and go away and it doesn't really help. And it has led to a lethal land sieges and other problems like that and as the salt gets into the soil it means that the land can't be used any more. And it is kind of slash and burn, well not burning yes. And erm the prawns don't really go to the people, they get exported to the US, the UK and Japan. And so it is not really helping the local people diets and they can't get protein from other stuff like fish so it is not really helping them at all. It is ... hindering them.

The boy's presentation was structured as a statement, which positioned the character along an imaginary power-line (being against prawn farming). His contribution collated a number of arguments that had been presented by previous contributors. For example, he made use of some distinctive geographical terms (i.e. slash and burn) as well as repeating an expression which was previously used by the boy in the Margherita group (*'it is hindering them'*). However the boy gradually moved out of role as he was completing his presentation (first line: *'we are against'*.....; last line: *'it is hindering them'*). His speech did not include elicitation of feelings and frames of mind, as suggested for example by the girl members (e.g. anger, and in relation to alcoholism, depression) in their previous discussion. Drawing on the information provided by the help-sheet, one of the adjudicators raised the problem of alcoholism. The boy's answer displayed some knowledge of difficult topics (i.e. capital mobility, 190), although his contributions were in the third person *'people get depressed'*. The discourse was constructed on the evidence provided by the information sheets and from the newspaper article. His intervention ended with a final appeal to personal responsibility:

196. Dharwar (boy 1): It says here that you should buy prawns from Iceland because they are fair traders.

197. Laura: Can you just say that a bit louder please?

198. Boy 2: Speak up.

¹⁸ As explained in Chapter 3 (page 121), many students did not turn up on the second day due to an overlap in the time-table.

199. Dharwar (boy 1): You need to buy your prawns from Iceland that is what this newspaper article says.

The presentation of the Dharwar group exceeded the allocated time of two minutes. The debate unfolded in an atmosphere of engagement, the audience was involved and willing to listen. Before closing the debate, the researcher asked the groups if they wanted to make any additional comments. Girl 2 from the Tami group moved to the front of the class to make a final remark:

203. Tami (girl 2): this group thought that our country concentrated too much on one form of trading and one way of getting money and ehm not concentrating on other ways because prawns won't last forever. And when that runs out they are going to regret it because they won't have anything to fall back on.

The girl from the Tami group put forward the group's thinking. The group had thought about alternative industries in order to ensure economic, social and environmental sustainability in the long term. This is an important contribution that shows the students' consideration of the future and an ability to consider many aspects of the same issue in a holistic way.

To sum up, in this section I have shown students' creative endeavours to give their characters' a voice. As they presented themselves in role they often put forward their character's justifications, responding to the questions of the adjudicators. The Court of Inquiry also contributed to further scrutiny of the character's views, values and beliefs, and in this process, students were able to provide both factual information and a reasoned argument. In other words, they articulated their knowledge and values to make for a specific point of view. The analysis showed that those groups that had worked more intensively in the previous part of the activity (reported in Chapter 4) were more able to articulate their values (e.g. 5-B; 5-G), whereas for other students the interpretation of the character remained more factual (5-D; 5-F; 5-H). On some occasions, students did not always remain secure in their roles (e.g. 5A, 5-C, 5-E).

5.3 The adjudication and the verdict

As explained earlier in Chapter 3, when I arrived in school on the second day of the role-play activity, I found a different class composition. The teacher presented me with a revised students' list, in which a third of the students were missing. Given my desire to give this study a naturalistic flavour, it was agreed with the teacher that the activity

should continue, relying on the presence of at least one representative from each group. The two girls from the adjudicators group and one of the boys of the Jeganatthan group eventually volunteered to complete the role-play activity.

After the debate, the adjudicators left the classroom to deliberate. I joined the adjudicators for their meeting, to provide help with the adjudication procedures (as was indicated in Chapter 3, the verdict would not include the possibility of compromise, and this was explained to the students at the beginning of the lesson). Quickly grabbing a pen and a piece of paper, one of the girls drew a straight line dividing the paper into two columns, on which she summarised and compared the good and the bad aspects of prawn farming, in a way which resembled an algebraic sum:

6. Priscilla: It obviously has its good points but these aren't long term
7. Dr. Goshivah: yeah
8. Priscilla: and they mainly benefit the ehm rich people.
9. Dr. Goshivah: Yes the rich landowners.
10. Priscilla: And it should, India needs to balance out as well.
11. Dr. Goshivah: Yes so then...
12. Priscilla: benefit is short term. And ehm it benefits rich and other countries, other rich countries e.g. America.

During the discussion the adjudicators immediately approached the relative concept of 'the good'. As a value-based construct, the girls assessed the benefits of prawn farming according to their distribution and permanency. For example, they were aware of the differences of *opportunity* for people from different socio-economical classes, and hence the ability of the groups to access socio-ecological services.

The adjudicators revised their notes in search of relevant information to support their adjudication. The first topic to be examined was 'health'.

6. Dr. Goshivah: *(she looks up her notes, then speaks)* And also the money that's the profits from the prawn farming should be invested in, like, clean water or like, the local communities, they are investing like well, prawn farming and also prawns are also a good source of protein but they are not being provided for the villagers they are being provided for everyone outside.
(...)
18. Priscilla: so it is not only not giving them the protein but it is also taking away the food they did have.

The girls produced a cooperative, integrated argument in which they clarified the distribution of the benefits that can be derived from prawn farming and how these were unequally spread.

The second other important topic for the adjudication was the environment. The girls produced a cooperative argument in which the doctor described some environmental aspects, while the second adjudicator summarised and conceptualised. Through this strategy, the students combined two ways of thinking about the problem: one looked at the detail, selected information and provided evidence, while the other looked at the general process, making summaries and evaluations:

- 19. **Dr. Goshivah:** Poor people have been affected because they sold their land to the prawn farming and they can't get it back because it is infected with the salt and it's (*unclear*).
- 20. **Priscilla:** It is basically destroying something that will be destroyed for generations, and you can't change the world like that. So they don't really have the right to change the world like, they don't really have the right to change the mangroves and stuff...
- 21. **Dr. Goshivah :** because they are an environment for the fish and that as well ehmmm

In this particular instance, the adjudicators managed to turn the fairly 'simple' issue of environmental impact, into a wider issue of responsibility and rights, for both human and non-human communities, in turn making the concept of socio-ecological classes more explicit. While the adjudicators appeared to have reached consensus on a verdict against prawn farming, I tried to get them to reconsider more carefully any alternative proposition in order to prevent a premature decision:

- 23. **Researcher:** I think that the poor people were not very clear about the alternatives they were suggesting
- 25. **Adjudicators:** yeah

In responding to my cues, the adjudicators produced a jointly-constructed argument which contained elements from the groups' presentations (which the adjudicators extracted from their notes) as well as the adjudicators' own thinking and conclusions. For instance Priscilla made reference to an example in order to draw a conclusion:

- 26. **Priscilla:** They could set up their own little farm and stuff but also they could set up a much bigger fishing industry because that will give the protein as well.

The second adjudicator, Dr. Goshivah, constructively used her notes to build on the previous contribution: she supported the idea of returning to a prawn-free situation, in which there was no problem of unemployment:

- 27. **Dr. Goshivah:** Yes because they are destroying all the fishermen's jobs. Yes and they are saying that they are creating great unemployment because although they are employing within the prawn farming they can't provide jobs for everyone.

At this stage, the adjudicators were looking beyond their specific concerns, as they tried to make a pronouncement for the benefits of the whole country. With such goals, the girls took on the shared team role – that of the adjudicators, considering alternatives and drawing conclusions. Their talk was cooperative and cumulative, focusing on the specific requirements of the local context:

- 30. Dr. Goshivah: ehm, there are alternatives though aren't there,
- 31. Priscilla: yeah
- 32. Dr. Goshivah: fish and rice.

When they reached the final evaluation, the girls adopted a more deliberative style, through which they weighed up the good and the bad points of prawn farming, and made their final pronouncement:

- 33. Priscilla: Yes. I think that the main good thing about prawn farming is that it will boost India's economy because India doesn't develop obviously, I mean it's the countries that are developed, like the Western countries that have done these sorts of things, but they have got their bad points as well.

In line with their supportive style, the Doctor added a comment aimed at clarifying why India should not follow the same route as the Western countries: 34. Dr. Goshivah: *'Yes and they have got the economy they have but you know they can afford to do that'*.

The comment showed how the process of deliberation, in line with Billig, was characterised by the adjudicator's minds swinging from one focus to another. In addition, in this case, the girls' vision alternatively moved from the Indian local context to the Western local context. Yet this approach also seemed to prevent the girls from keeping a global view on the issue. Moving back to the Indian local context, Priscilla expressed her final consideration, a subsistence economy for India:

- 34. Priscilla: Yeah, I mean as long as they have got enough food to feed their people and there is a relatively good standard of living then they do not really need to be rich.

The statement from Priscilla proposed a concept of good living as opposed to a greedy, materialist life-style (need to be rich). This was meant to be a recommendation for the benefit of the non-urban people of India, while ignoring the preferences of the minority yet more powerful portion of urban Indian people. The final verdict was pronounced as a double-edged justification, considering the disparity of the benefits and the indeterminacy of the long-term benefits.

41. **Priscilla:** Okay we would just like to close down the prawn farms because basically it is not, from what we have heard, it is not helping the local people which is most important and it is not long term.
42. *General applause and boos*
43. **Dr. Goshivah:** Thank you. Yes and basically it is not actually helping, it is not making any beneficial impact on the local people of India because it is not providing as much employment as say other industries will and also oh yeah, yeah
44. **Priscilla:** And also it's that they don't have a right because it is destroying animals as well so they don't have the right to do that.

While the doctor made an appeal to possibilities for other industries which could offer more employment opportunities, the adjudicator Priscilla dismissed any possibility of compromise with an appeal to fundamental rights of other species (animals) which was the final, conclusive evaluation.

In sum, during the decision-making process the adjudicators gathered the information they had received from the Court of Inquiry and performed a review of prawn farming. They adopted an evaluation sheet which focused their thinking on normative issues: the good and the bad, and the morally right. They linked the benefits of the human communities with the environment on the one hand and then contrasted this view with the Western model of development on the other, treating the two realities as irreconcilable.

In the next section, attention is turned to the analysis of students' feelings and views on the activity.

5.4 Results from questionnaire 1

Questionnaire 1, part A: How did I feel in my role?

An analysis of students' emotional involvement in the role-play was important to ascertain students' engagement with their roles. One group of answers indicated that students tapped into the moral dimension of the issue. They expressed a sense of *duty*, accompanied by an imperative to follow the *right* decision and to take action. For example:

Like it was my duty to stop the prawn farming
 I felt that my role was the fairest out of all. They had the right beliefs for the right reasons
 I felt confident that my opinion was correct and that it was right for the environment

Some students experienced the cognitive aspects of role-playing, engaging with critical and rational thinking. For example, they weighed up and evaluated alternative options and opinions:

I enjoyed my role as I was able to look at and balance the good and bad. Not just looking at one side. (Adjudicator, Priscilla)
I felt I had a role of great influence and glad that I could be fair in the decision taking into account everyone's opinion. (Adjudicator, doctor)
I enjoyed criticizing the prawn farmers
I didn't feel much a part from that prawn farms obviously wasn't the answer

When in role, students generally felt involved, showing an interest in the issue and in the role-play activity. Students talked about 'being in tune' with the perspective of the character, and they felt motivated:

I felt like a true Indian villager. I found it quite easy to get into my role because I agreed with my character's role (Dharwar)
Like a true Indian minister and that I could give across my views (Sonja)
I felt like a true Dharwar Indian villager leader. It was exciting and thrilling (Dharwar)
I felt that my role was quite interesting although I felt a bit nervous about the topic and discussion we did.
I felt Dutch because Margherita is from Deutschland and I didn't like prawn farming (Margherita)
I felt dedicated to my role as I agreed with the points the doctor put forward and they seemed a fair argument
I actually got quite into it and felt strong about what I was fighting for
I quite liked my role.
I felt that I was in great position for making money. The reason why I was prawn farming was to live and supporting my family (Shailesh)
I had fun – I felt that I could relate to him/her a tiny bit
I felt that although our point was not put into action, my role was quite important in the groups, our discussions were educational and our points were put across in a considerable manner
I felt in command in my role as I was an adjudicator

However, role-playing was not always easy. A group of students found it quite difficult to express themselves in role. They did not immediately use empathy and creativity, and they disagreed with the card:

I felt fairly confused and somewhat oppressed in my role. I felt that the more confident people instantly took control of the situation and I didn't really get a chance to express myself
Hard to get into role despite card
I felt ignorant, pompous and autocratic (power)
I felt very powerful, yet very autocratic (power)
Uncomfortable because I didn't agree with what I was arguing

In sum, the data presented here indicated that many students took on a role, and this was associated with a sense of morality. They dealt with the concepts of right and wrong and good and bad. However, when they disagreed with their character, it was more difficult for students to take on a role, and so they failed to express themselves as well. These results emphasize the personal and social dimensions of being in role and the difficulties

that students encountered. While the interaction in small groups was supposed to create a positive and supportive social environment which would facilitate role-taking, some students were still unable to overcome the clash of values and to step into another perspective.

Questionnaire 1, part B: After the Adjudication?

The adjudication triggered both positive and negative feelings in the students. Positive feelings related to a sense of victory:

Pleased
I felt victorious (Dharwar)
I thought that they chose well (Dharwar)
After the adjudication I felt rather pleased that we won the adjudication although personally I was neither for nor against prawn farming
Happy because the adjudicators voted in favor of closing the prawn farms
Pleased and relieved (and hungry)

Some students also expressed a sense of relief, which derived from the declaration of the verdict:

I feel that as an adjudicator we made the, although hard, correct decision for the local people of Southern India (Priscilla, adjudicator)
I felt we came to the right decision after weighing out the pros and cons (doctor, adjudicator)
Pleased that the adjudicators made the right decision even though my character wanted opposite results
I think it is good that prawn farming will stop until further research is carried out (Margherita)
Pleased because the decision was what I wanted even though my role didn't (Power?)

The negative emotions also indicated that the students perceived the debate as a competitive game, and some students felt annoyed and disappointed:

A bit annoyed (Power)
Rather left? (Power)
Unhappy that it was chosen to abolish them, but I understand better (Sonja)
Disappointed – I clearly didn't do a good enough job! They closed down the farms!

Some students felt concerned about their characters. For example:

Although I believed that Sonjia Rey's view was very important, but our views was not used in the final adjudication
Well, if It was in real life then I would probably have become really poor and my family would probably die (Shailesh)

One student reported a lack of emotional involvement:

I didn't feel much. The same

Students' comments from the questionnaires showed that the majority of the students often felt involved and participated in the role-play. By taking on a role, some students could experience a sense of moral duty, and sometimes a sense of empowerment which was associated with the possibility of expressing personal views and taking responsibility for themselves. The link between being in role and taking action was often noticeable. Action was specifically described by one student in terms of *purpose* (e.g. to live and support a family), and by another student in terms of its struggling nature, a fight. On the contrary, those students who did not feel in role reported inhibition of social action. However, the feelings expressed by the students also revealed something about the students' *attitudes* during the Court of Inquiry. Students' comments indicated that they viewed the experience as a competitive situation, and they took sides. Many students were relieved after the adjudication, and they were sufficiently satisfied with the adjudicators' pronouncement. However, one student expressed concern about the verdict and worded his disappointment using the perspective of his character (e.g. Shailesh). Equally, two other students felt sorry because their views had not been taken into account. This suggests that students had perceived the ethical dimension of the issue. They were inclined to take action but they were also feeling the need for a higher order consensus which could effectively address everyone's views and needs.

5.5 Summary

In the role-play, students began acting by stating their prepared characters' positions. During the simulation of the Court of Inquiry, all groups started their presentations by speaking in the first person and by declaring their identities and backgrounds. There was no need to insist upon the students' attention or to make any disciplinary intervention; rather an organised mutual interaction between the audience and the speakers took place. As the students 'took the stage', they engaged with the complex task of expressing a point of view. The analysis of the questionnaires and the students' presentations was thus important to unpack the notion of role-performance and the learning process that occurred.

Just from listening to the students' voices in the course of the simulation, it appeared that they did more than simply read the card. For example, their presentations were richer in meaning than the original card-descriptors. In addition, the analysis of the questionnaires confirmed that students felt in role, and they understood their characters' reasoning. Interestingly, students appeared to be able to tap into the values and beliefs underpinning different socio-cultural experiences, some of which would be different from students' own everyday experiences. The analysis of the questionnaires and the groups' discussions seemed to suggest that taking on roles was very much a *social affair*, a result dependent upon the coordinated action and engagement of the group members. For example, the feelings of self-consciousness expressed by the Paul Power group were in line with previous observations about the group's difficulties in building consensus. On the contrary, confident presentations from the students during the simulated debate were linked to successful group interactions. The group members appeared to mutually support each other with remarks and notes of encouragement; they also contributed to the presentations by adding new information, or taking over the presentation, if necessary. In line with previous observations from the pilot study, the analysis suggested that working in groups and building consensus was an effective way to help students to take on roles.

The simulation of the Court of Inquiry provided not only a forum to present different points of views, but also to pursue incompatible goals within a competitive framework. In this context, students displayed their language skills, and most importantly their communication *strategies*, as they tried to pursue their characters' interests. The term

‘strategy’ is used in this context to indicate an integrated set of concepts and words, which each character selected, and made use of, in order to take part in the debate. The analysis of the debate looked at each character, in terms of reasons and goals.

Additionally, the *interactions* between the different contributions and the *effects* that each word or action had on the participants was considered. This was made visible in the analysis through the repetition of previous contributions (e.g. Paul Power at 126) and the reactions of the audience (e.g. Sonja Rej’s loss of face at 10-11).

It was through this kind of analysis that the characters’ presentations could be understood as part of a dynamic context of knowledge exchanges, in which information was linked to a set of values and assumptions. The analysis effectively revealed and highlighted the contradictions between goals and perspectives held by the characters. For example, in exchange 5-D, the biologists produced a collaborative argument, in which they made links between the different parts of the ecosystem and effectively conveyed a sense of mutual interaction between the human communities and the environment. By contrast, the arguments of the doctors and the local entrepreneurs focused very much on specific aspects of the prawn farming industry, the nutritional aspects of the prawns and the specific technicalities of the prawn farming industry. A broader approach to the problems of the people in the environment was thus contrasted with a narrower focus on the cost and benefits of prawn farming to illustrate two different mindsets and ways of looking at the issue.

In other words, the different roles and perspectives influenced the way in which students approached the problems by setting the *boundaries* of their concerns and these concepts also appeared to be linked to their choice of scientific metaphors. For example, Margherita moved from the linear concept of ‘food chains’ to that of ‘food webs’, revealing feed-backs and non-linear interconnections. On the other hand, Dr. Krishna deployed the argument of the progressive evolution of human populations as the inevitable struggle of the fittest in a scarce/inadequate environment. In addition, while the government officer and the entrepreneurs conceptualised progress as a linear function of time, which can grow indefinitely, the local villagers believed that such progress could only occur at the expense of Nature and therefore could not lead to progressive growth and life improvement. These two views reflected optimism on the one hand and destruction on the other (*Tami: eventually the whole India will become like infertile*). This has a bearing on two opposing views represented by a sense of

confidence in the power of science and technology to transform Nature on the one hand, and the possibility for people to live as a human component in a balanced ecosystem on the other. In addition, the different characters seemed to have elaborated different positions in relation to risk. For example, while the civil servant made an appeal to the experts, the local villager (Tami) built her argument on the possibility of the unexpected, and argued for precaution and forward thinking. In Table 5-A I have summarised the characters’ positions on risk.

Table 5-A Relationships between presentations and students’ concept of risk

Group/character	Content	Position on risk
Sonja	Promote India’s economic development	Trusts the experts (15 - 5A)
Tami	Declare the risks associated with prawn farming	Expect the unexpected. Call for precaution (30 –5B); (203 – 5H)
Shailesh	Promote personal interests	Minimise risk (75; 5C; 81-82; 5C)
Margherita	Describe the links between human communities and ecosystems	Declare damage as a possible risk (93; 5D)
Power	Promote the interest of a group	Ignore risk, rationalise responsibility in monetary terms (142; 5E)
Jeganatthan	Declare the flaws of prawn farming	Frame responsibility as blame (149; 5F)
Dr. Krishna	Support prawn farming as a means for improving nutrition	Consider Nature’s scarcity as a prime notion of risk for human communities in India (166; 5G)
Dharwar	Criticize prawn farming	Declare environmental damage and health hazards as possible risks (180; 5H)

In light of these findings, students seemed to have had the opportunity to express themselves through different discourses. However, it is not clear whether they were able to listen to others and were being *listened to*. As some comments in the questionnaires responses indicated, not all of them managed to get into role and to express their reasoning. In addition, the adjudication process forcibly split the students into two camps of winners and losers.

As mentioned before, alongside the ability to perform team-work and to achieve internal cohesiveness, the interaction in the Court of Inquiry was structured as a form of strategic interaction, in which the groups engaged with the pursuit of incompatible goals. The diagram in Figure 5.1 provides a visual representation of the flow of information during the Court of Inquiry. On the left hand side of the diagram there is a

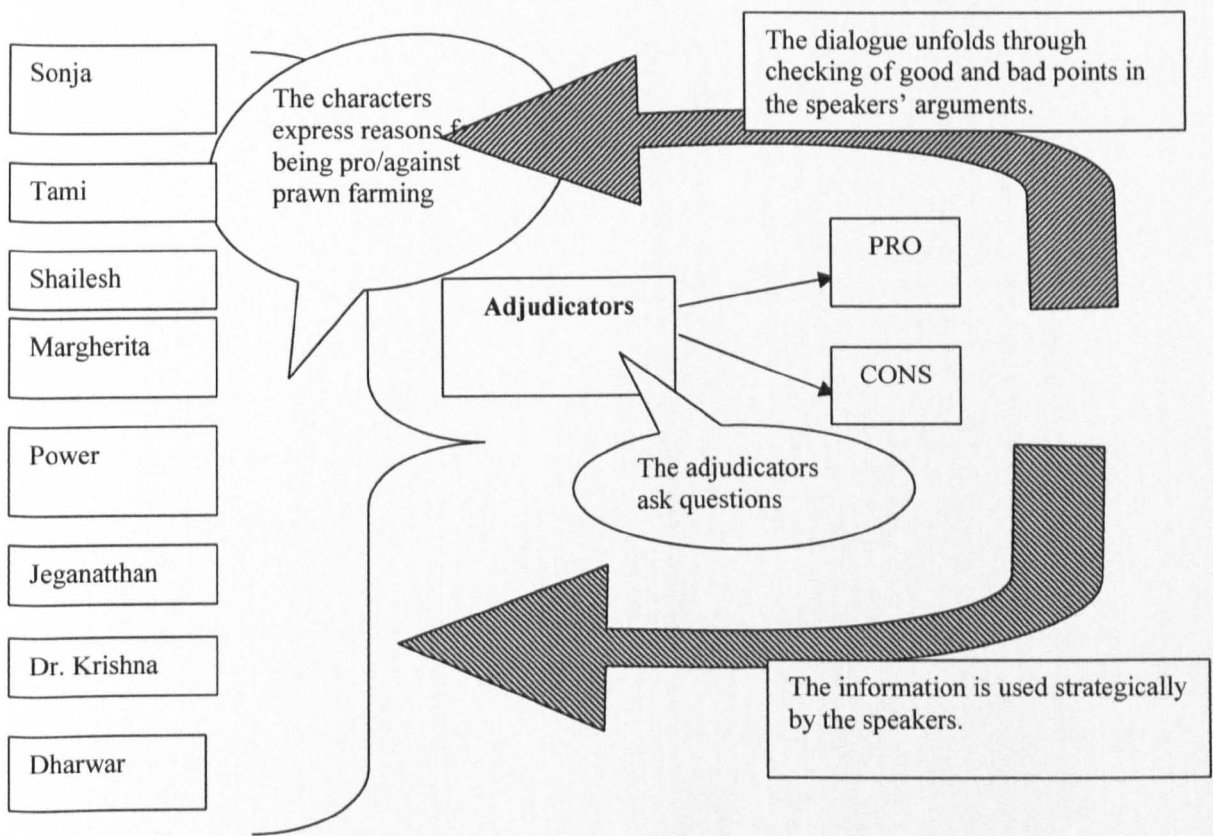
list of all the presenters, who represented the variety of agents with a stake in the controversy. They all interacted with the adjudicators, who scrutinised, compared and evaluated the information being given to them. In the diagram, the central position occupied by the adjudicators indicates that information was extracted from the Court of Inquiry through an iterative process of questions and answers. New understanding was progressively deployed to formulate new questions and to disclose further information. In this respect, the rules of the game created an underlying network of themes and issues which were progressively woven together, depending on the content of the role-cards and the students' ability to verbalise their points of view, and to take account of new information. An interrogation of the transcript shows the two main features of this process:

The nature of the questions: from the open and rather simple questions asked at the beginning (*what are the bad points?*), the adjudicators' questions became more critical, articulate and also more focused: '*so it did not make any difference to your health?*' (Adjudicators, example 5-C).

The nature of the presentations: after the first three presentations in which the students mainly reported their own prepared statements, with the performance of the Shailesh group and subsequently more visibly, with the performances of Paul Power and Jeganatthan, students' presentations began to display strategies of 'power alignment' (e.g. Shailesh, Paul Power, Dharwar).

Thus, in the course of the interaction, new information was presented and disclosed by ongoing questioning, and such information appeared to either reinforce or weaken the speakers' arguments, hence creating a situation of interdependence, in which none of the stakeholders could improve their position unilaterally.

Figure 5-1 Communication between characters and adjudicators during the public inquiry



In the context created by the Court of Inquiry, the emergence of power-struggles was noticeable. Participants attempted to convince the audience to agree with them, by appealing to the common good (e.g. Shailesh), or by advocating a compromise solution (e.g. Paul Power). In such a situation, the adjudication was a rational process of exchange of arguments to enable the adjudicators to pronounce a verdict based both on factual and normative issues (e.g. what was morally right, as indicated by Hastie and Pennington, 1991). In this sense, the findings appear to be in line with the observations of Moscovici and Doise (1991) concerning the limitations of allowing participants to settle on a compromise: in a situation of interdependence, all stakeholders would try to seek to work out a fair decision, in order that each is guaranteed a share of the power. In such circumstances, even if compromise might seem a natural tendency, it might also have ruled out other possibilities and the discovery of a larger ‘game’ extending beyond the preservations of self-interests.

Ultimately, the adjudication process sharpened the contrast between two irreconcilable worldviews, such as the small-scale, need-driven economy of the local villagers and the large-scale, interest-driven economy of the Western countries. In some ways however, this debate concealed the global perspective embedded in the role-play. During the adjudication process the adjudicators gradually moved out of their individual roles as

adjudicators with specific concerns (e.g. health, nutrition), in order to take on a collective role as objective decision-makers. As they progressively constructed this shared role, they started to formulate personal priorities with a stronger tone of certainty, while speaking in the third person: e.g. '*they do not need to be rich*'. In the end, while the verdict helped to settle at least the more competitive forces as they arose during the debate, students' reactions after the adjudication showed that some of the incompatible goals underlying the issue had not been addressed (e.g. the verdict did not really help to solve the problem of food). The responsibility for the decision rested with the adjudicators and feelings of dissatisfaction arose.

In conclusion, the analysis of the decision-making process showed that the adjudication was based on the consideration of both evidence and values, and included some consideration of the scientific aspects. However, after the adjudication, it also became clearer that other elements, such as character, compassion and personal experiences could contribute to the process of finding a solution to the controversy. This aspect raises questions about the effectiveness of the adjudication, and this point will be considered again in the next chapter, which addresses the resolution of the conflict.

6. Conflict and resolution

6.1 Introduction

This chapter describes students' performances in the course of the second part of the activity (Stage 3 in Figure 3.1). In this task, students were asked to perform their roles in groups of opposing opinions, and develop effective strategies for dealing with conflict. This chapter presents the findings from the analysis of students' discussions and the questionnaires, to produce a rich picture of students' reactions to the conflict and how they learnt to deal with the challenges presented through constructive dialogue.

6.2 Arrangement of students in groups

The task here was to get students to work in groups of characters holding contrasting opinions, in order to address the conflict. The focus of the analysis was on the language strategies students used to improve mutual understanding, through communication and participation.

As mentioned in the previous chapter, not all students who had participated in the role-play on the previous day were able to play on the second day, and some students joined the activity for the first time. This affected the composition of the small groups and the nature of previous relationships. Table 6-A provides an overview of the groups that participated in the activity. The first and third columns display the original make up of the groups (Characters 1 and 2) and the final make up of the combined group in Stage 3 of the activity (labelled as A-D). X indicates the students who were originally part of the groups and were missing here. The fourth column gives some details about the nature of the interactions within the newly formed combined groups in Stage 3.

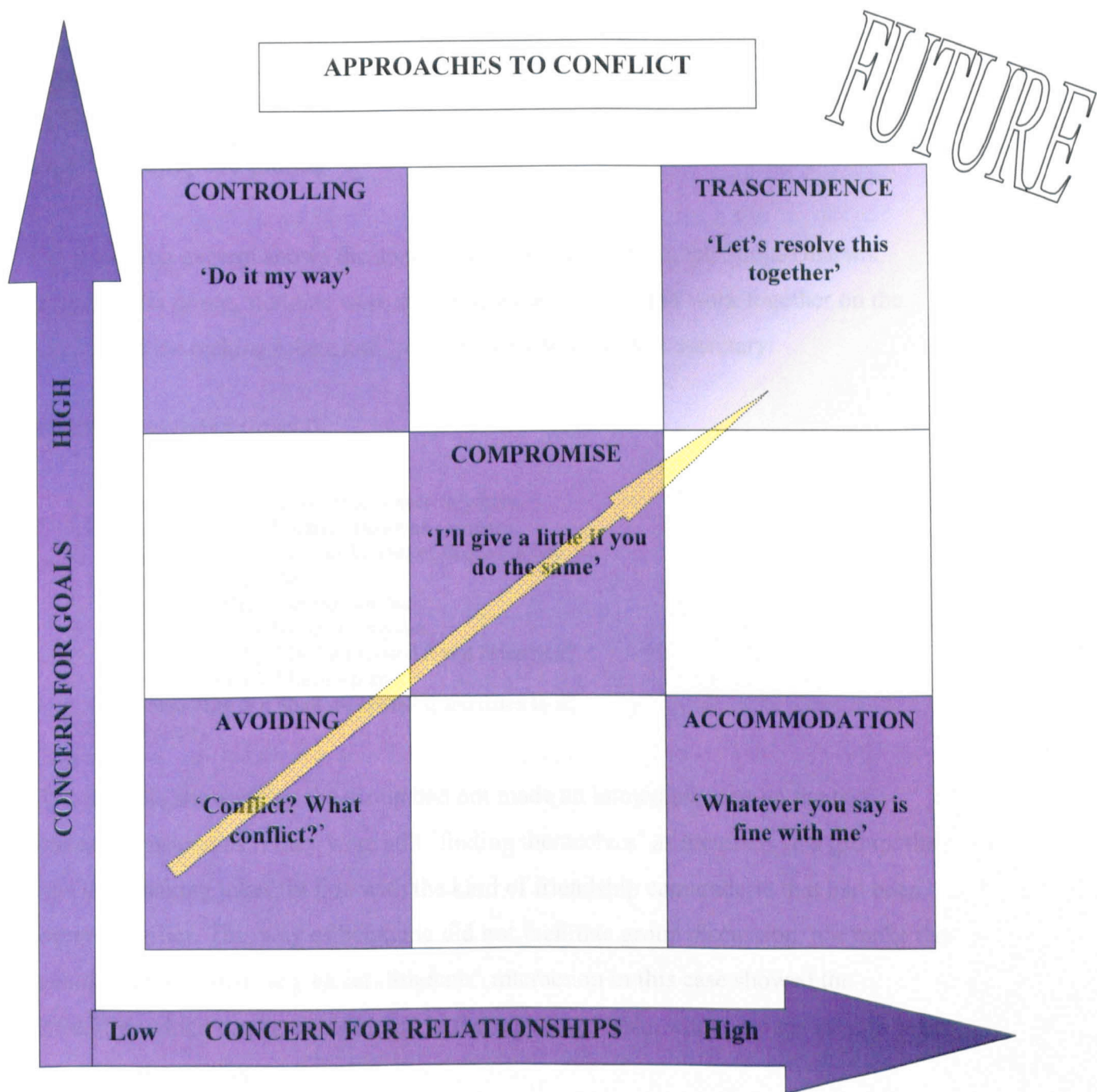
In practice, students were given an input from the senior researcher about the nature of conflict and common approaches for resolution. The diagram 'approaches to conflict' (Figure 6.1), discussed in Chapter 2, was used by the senior researcher to describe the task. Participants were encouraged to take on role and to use empathy to communicate with their peers, with the task of thinking of a desired future, and '*an outcome where everybody can agree*'. For the purpose of the analysis, the transcripts were interrogated

to ascertain the cognitive, emotional and social challenges which students encountered in the process of dealing with conflict, with a focus on both the process and outcomes.

Table 6-A Make up of the groups in Stage 3 (Main study)

Character 1	Combined group	Character 2	
Dr. Krishna	Krishna-Margherita (Group A)	Margherita	Notes
Boy 1 Boy 2 Girl	X Krishna (Boy 2) Krishna (Girl)		Interaction was mainly between the two boys. The girls made a couple of critical interventions.
	X Margherita (Girl 2) Margherita (Boy)	Girl 1 Girl 2 Boy	Krishna (Boy 2) spoke very little in the first activity, while he took a prominent role in the second activity.
Tami	Tami-Shailesh-Goshivah (Group B)	Shailesh	
Girl 1 Girl 2 Boy	X Tami (Girl 2) Tami (Boy)		Interaction was predominantly between the Tami girl and the Shailesh boy 1.
	X Shailesh (Boy 1) Shailesh (Boy 2) Adjudicator Dr. Goshivah (Girl 1)	Girl Boy 1 Boy 2	Tami (Boy) made gradual attempts to speak in the first lesson and his contributions were included in the general cooperative talk of the girls. This development continued through the second lesson. Shailesh (Boy 2) disengaged with the task in the first lesson, while he made more contributions in the second lesson.
Paul Power	Power-Jeganatthan - Priscilla (Group C)	Jeganatthan	
Girl Boy 1 Boy 2	X Power (Boy 1) Power (Boy 2)		The two girls swapped their roles. The group entered an escalation of conflict, which was particularly strong between the boys.
	X Jeganatthan (Boy 2) Jeganatthan (Girl) Adjudicator Priscilla (Girl 2)	Boy 1 Boy 2 (girl)	
Sonja	Sonja-Dharwar (Group D)	Dharwar	
Girl 1 Girl 2 Boy	Sonja (Girl) X Sonja (Boy)		The group searched for practical solutions but they struggled to keep focused.
	X Dharwar (Boy 1) Dharwar (Boy 2) X	Girl Boy 1 Boy 2 Boy 3	Boy 3 from Dharwar group spoke a little more in this context than he did in the first activity.

Figure 6-1 Path towards the future (modified by Fisher et al. 2000)



6.3 Initial exchanges

At the start of the activity, the new groups needed to organise themselves for the task and to decide upon the appointment of a secretary. The analysis of the initial exchanges describes how the groups approached the conflict, starting from the organisational aspects, through to the handling of relationships and discussion.

6.3.1 Pushing and pulling

The following excerpt shows the appointment of a secretary in the Sonja-Dharwar group. In this group, students were still struggling to focus and work together on the task; they were making jokes, and ‘pushed’ somebody to be a secretary:

1st minute of recording, Group D:

1. Dharwar (boy 2): Yep Bruce is secretary here.
2. Dharwar (boy 3): We have Bruce as secretary.
3. Sonja (girl): We'll have to do a bit of Bruce Forsyth.
4. Dharwar (boy 2): No.
5. Sonja (boy): Bruce the big (*unclear*).
6. Sonja (girl): I want to say to anyone...
7. Dharwar (boy 3): Shall we rewind it and listen to it?
8. Dharwar (boy 1): I have a plan.
9. Dharwar (boy 3): Shall we rewind it and listen to it?
10. (tape stops)

This example showed that the group had not made an immediate start on the task. Students appeared as if they were still ‘finding themselves’ as members of a group: the boys kept making jokes, in line with the kind of friendship camaraderie that had been observed earlier. This way of behaving did not facilitate group discussion, nor make the task of finding a focus any easier. Students’ interaction in this case showed the difficulties which can be encountered in these kinds of tasks where groups need to learn how to work together.

6.3.2 Taking sides

In this example, students’ talk is indicative of students’ attitudes towards the conflict:

1st minute of recording, Group C:

5. Jeganatthan (girl): Do we know what we actually meant to do? For and against?
6. Jeganatthan (boy 2): Yes.

7. Priscilla (girl 2): We are for and against.
8. Jeganatthan (boy2): yeah
9. Jeganatthan (boy2): we are for.
10. Power (boy 2): Yes.
11. Jeganatthan (boy2): No we are against.
12. Power (boy 1): Sorry about that technical difficulty (*fiddling with the cassette recorder*).

The excerpt described the start of a confrontational and competitive exchange between the students: students positioned themselves on a partition line, like players in a game. The initial confusion of the Jeganatthan group about 'being for' or 'being against', and the making up of an Indian accent by the Paul Power group, also suggests that at this stage, students were not really concerned with interpreting the situation and with presenting themselves through their roles. For example, following the initial discussion the ex-adjudicator Priscilla swapped her role with that of the Jeganatthan (girl), who took on the role of the secretary:

End of the 1st minute of recording, Group C:

54. Priscilla (girl 2): ok, what so:: you are secretary
55. Jeganatthan (girl): no, you are
56. Priscilla (girl 2): so (*incomprehensible*) personally
57. Jeganatthan (girl): ooh::: okay.
58. Priscilla (girl 2): oh! You can take my role
59. Jeganatthan (girl): yeah, sure.

This episode generated some disturbance in the group. Later in the discussion, some students made an appeal to her authority as an adjudicator to intervene in the conflict, but the girl, in her new role, was unable to respond to this request:

End of 3rd minute of recording:

104. Priscilla (girl): [yes but okay but the adjudicators, the adjudicators]
105. Jeganatthan (girl 2): I am not an adjudicator.

It was also difficult for the adjudicator to take on the new role and perform:

End of 4th minute of recording:

160. Priscilla: Amanda, we are meant to be uhm...teaching people the way Ghandi people taught us to live.
161. Jeganatthan (girl 2): Well I am not agreeing with that.

As the discussion progressed, managing discussion in this group became increasingly problematic and students struggled with sharing their perceptions, their knowledge and their experiences of their roles.

6.3.3 Presenting oneself in role

In this excerpt, the situation was quite different. Two speakers were responsible for most of the talk, and they started by declaring their respective identities. The adjudicator took on the role of the secretary, and played a silent role in the background. The following example shows the beginning of the discussion, in which students presented themselves in role:

1st minute of recording, Group B:

1. **Tami (girl 2):** Okay. Well folks we are Tami, and you know that and we are basically poor with little land, we are forty years old we are only middle aged so we can't exactly get up and move, we can't travel.
2. **Shailesh (boy1):** So how are we affecting you then?
3. **Tami (girl2):** you are affecting us because um our land is being taken and we saw people in our region losing ten thousand hectares of coastal land when the government sold it to industrial companies for prawn farming. Who are you again?
4. **Shailesh (boy1):** I am Shailesh.

Interestingly, students did not seem to take sides, but at least one of them expressed their concerns. One of the Tami girls, who had been consistently eloquent throughout the activity, made the first move and presented herself. Shailesh's question at 2 opened the dialogue, but Shailesh may only have been asking something in general, without necessarily being concerned about the other character. Still, it seemed that the discussion in this group was set in a more constructive tone. By presenting herself in role, the girl emphasised the problem of poverty generated by the prawn farming policy, and it is significant that the topic of poverty and power differences was explored again at several points during the discussion, with the same narrative tone. This is an important aspect of the conflict which the characters begin to explore:

For example:

4th minute of recording, Tami + Shailesh

41. **Tami (girl 2):** Also, also I mean I take your point that you do prawn farming to make money because you can't, you can't do anything else because ehm you are in a similar position to us and you chose to farm prawns, but just think about you are [taking]

Here, it seemed that students experienced discomfort in the new task. Some students had difficulties in organising themselves as a group, while other students took sides, emphasising the gaming aspects of the activity (we are for/against). In contrast, when students managed to see themselves in role, as shown by group B, they appeared

concerned to present their perspective and engage in a relationship. Interestingly, this group talk was handled by two people and there did not seem to be a need for authority.

6.4 Reacting to conflict

After the first minute of the activity, all groups started discussing. In group D, students' talk was still largely constituted by individual contributions, without any particular structure or relationship between them:

Over 1st minute of recording, group D:

11. Sonja (girl): Okay basically we want to try to find more effective ways (*the boys make a lot of noises while she is speaking*) to make the prawn farming.
12. boys: *prawn a-ha,u-uh,eh-eh*
13. Sonja (girl): To make the prawn farming more effective and more ... uhm...[um ecological]
14. Dharwar (boy 1): [Er yeah use money to...]
15. Dharwar (boy 2): Sonja Rej.
16. Sonja (girl): [Sonja Rej!]
17. Dharwar (boy1): [to make... prawn farming...] *he tries to complete his sentence while the other boys are making jokes in the tape-recorder*
18. Dharwar (boy 3): [Son-jei!]
19. Dharwar (boy1): [...Sustainable!]. Any more suggestions over here, what do you have to say about that Dharwar?
20. Dharwar (boy 2): I think it is great.

In this group, students expressed comparisons and evaluations (e.g. *more effective ways*), and they referred to 'technical' terms (e.g. *more sustainable*), showing that they had some knowledge of environmental issues. However, they did not engage in any kind of mutual clarification of meanings, and their thinking did not seem to progress into articulated discussion. There does not seem to be any conflict in this group, but the students appeared more concerned with the resolution of specific problems.

In contrast, the other three groups appeared to have moved from an initial phase of setting the scene to exchanging personal views and opinions. In this case, other elements of the conflict situation, either negative (such as power control) or positive (such as empathy) began to emerge.

6.4.1 Controlling

In Group C, students were making jokes and noises when one boy started speaking. It took a while before the group started to pay attention:

Over the 1st minute of recording, group C:

- 38. Jeganatthan (boy2): I think we... Shut up!
- 39. Jeganatthan (girl 2, ex Priscilla): Henry shut up!
- 40. Jeganatthan (boy2): I think that we should ehm stop prawn farming because uhm, there are better ways of producing money for the Indian locals.
- 41. Jeganatthan (girl 2): Yes we can see that as we are an old man okay, we have lived in India a long time and we can see that it needs to be developed for the goodness of the people but [there have to be alternatives]
- 42. *overlapping voices, the tone of voice grows louder.*
- 43. Power (boy 2): [Um Paul Power].
- 44. Power (boy 1): [We are American right!].
- 45. Jeganatthan (girl 2): [No we are Indian ok?].
- 46. Power (boy 1): (*overlaps*) [Speak to the head because the head isn't listening, because we are Paul Power]

The intervention from the Jeganatthan boy was reminiscent of the verdict (e.g. *we should stop prawn farming*), and it was formulated as an evaluation/judgement (e.g. *more ethical ways of producing money*). Similarly, girl 2 expressed herself in the role of a local villager. However, the excerpt also shows that the other group did not really engage in the discussion. They kept on repeating their identity, in a struggle for asserting their power, but actually without establishing dialogue.

6.4.2 Arguing

In this group, students performed dialogue in role, engaging in argumentative exchanges:

Over the first minute of recording, group A:

- 11. Margherita (boy): Okay Doctor Krishna what do you believe?
- 12. Dr. Krishna (boy2): (*makes an Indian accent*) I believe that I do not want to see any more of my children dying in India.
- 13. Margherita (boy): well I believe that - I come from Holland - I believe that the prawn farming industry is killing lots of it is killing lots of prawns(...) and wild prawns and fish that were hiding in the mangroves [and so ...]
- 14. Dr. Krishna (boy2): [well] have you ever been to India?
- 15. Margherita (boy): I have as a matter of [fact].
- 16. Dr. Krishna (boy2): [Ah, good for you] then you will know about the amount of children dying from lack of protein.
- 17. Margherita (boy): aha!

18. Dr. Krishna (boy2): (*raises his voice*): So you are aware that this large prawn farming industry could solve that problem,
19. Margherita (boy): YES
20. Dr. Krishna (boy2): are you not?
21. Margherita (boy): Yes I am aware of it but...
22. *Girl smiles in the background*
23. Dr. Krishna (boy2): But (*raises his voice*) what do you care more about: some fish or some human lives?
24. [...]
25. Margherita (boy): But I [beg you listen]
26. Dr. Krishna (boy2): [but, but no no]

The students took on role and addressed each other through their characters' names. Their statements revealed the stakes and interests of the characters. One boy presented a view of the world in which the human communities have priority (i.e. 23), whereas the other boy, playing the biologist, supported a view of ecological preservation. It is interesting to note the rhetorical question at 14, which was used by Dr. Krishna to persuade Margherita of the superiority of his knowledge and experience. As a result, the exchange of views led the characters to raise their tone of voice.

In this excerpt it was possible to recognise a type of talk which was both competitive and collaborative. The talk opened with an invitation to express views (10), and then unfolded through a series of overlapping exchanges in which the boys presented their alternative points of views. The talk was constructed as a series of symmetrical moves which allowed the boys to present their two views, and made them clearly appear as separate and irreconcilable. The recorded voices in the tape also sounded stronger and more powerful than before, as if they were following a drama script. It is important to reflect on Krishna's statement at 23. Here the doctor expressed a kind of anthropocentric ethic, linked to what had been previously described as a kind of *reductionism* (Chapter 5, example 5-G), which focused on single or solutions for complex situations, such as Indian poverty. This makes a stark contrast with the images of 'people in the environment' described by the local villager Tami, just below.

6.4.3 Touching upon the moral space

In this group, the initial exchanges between the parties were framed within a discourse of morality, which filled the talk with appeals to right and wrong, blame and responsibility. Students showed greater knowledge and perspective of their roles and the discussion took a more sombre tone:

1st minute of recording, Group B:

9. Tami (girl 2): [There] are so many other things that you could do and you are taking away things, the little things that we have to help us survive.
10. Shailesh (boy1): We could employ you and if we employed you, you could like earn a lot like a steady wage and you would never go hung[ry].
11. Tami (girl2): [But] it is morally wrong, we believe it is morally wrong.

This excerpt is an example of a communication blockage, in which the two parties struggled to understand one another. For example, the girl mentioned the ‘things’, and the ‘little things’ they needed to survive, to which the boy responded with an offer of materialistic value (i.e. steady wages), perhaps without noticing that there might have been something more to the girl’s definition of ‘things’. While the use of the adjective ‘little’ may simply refer to the frugal economy of the Tamil people, in language terms, it can also be used to describe a constellation of images, of places and identities (e.g. the sense of place, of belonging), which make for the girl’s sense of existence in that environment. By taking this view, we can perhaps understand better the sense of frustration and alienation that the local people involved in the conflict might have experienced, and the girl’s moral sufferance at 11. The sense of turmoil is such that later in the discussion, the boy asked her to explain what she meant by ‘*morally wrong*’. At that point she found herself short of words, e.g. turn 22: ‘... *I can’t think, it is just, it’s... like... I don’t know, I know what I want to say I just can’t think of the words...*’ The concept was difficult to grasp, and perhaps it was quite deep; the girl felt quite emotional, although such emotion was expressed in quieter terms as compared to the previous groups. Rather than the agitated character of anger and aggression, the girl in this group communicated feelings about moral positions and empathy.

6.4.4 Declaring contradictory aims

In the course of the discussion, students progressively approached the contradiction at the heart of the conflict. For group C, the problem was framed as a competition of interests and benefits:

Just over the 2nd minute of recording

68. Jeganatthan (girl 2): we need, we want the goal to be the benefit of the Indian people not to benefit other countries.
69. Power (boy 2): No I don’t quite agree, [we need lots of prawn farms you see].
73. Power (boy 2): you see, we actually need lots of prawn farms to boost the economy.
74. Jeganatthan (boy2): Why? Why do we need more!

In this excerpt, students experienced the inherent complexity of socio-environmental issues, in which stakeholders bring different interests, needs and values to the discussion. In this group, students' interaction led to a quick escalation of conflict, culminating in a series of attacks and defences. Students increased the tone of their voices, and they provoked conflict on interests:

- 77. Jeganatthan (girl 2): [Yes but basically] in the future that [is sort of short term]
- 78. Jeganatthan (boy2): [Your prawn farms are useless]
- 79. Power (boy 2): (*in a loud voice*) [Excuse me?]
- 80. Jeganatthan (boy2): [and all the Indians have] died out because they have got no money.
They all react and start speaking at the same time
- 81. Power (boy 1): [no we, we]
- 82. Power (boy 2): [Um no money...let me explain]

A later passage in the transcript highlights the difficulty for the characters in thinking together about the future. The adjudicator reminded the group about the results of the verdict - the stopping prawn farming - which threw the boys in the Paul Power group into a state of uncertainty and confusion:

4th minute of recording

- 112. Power (boy 2): oh, I don't know.
- 113. Power (boy 1): Stumped!
- 114. Power (boy 2): we are a bit screwed now aren't we?

This led the group to 'jump' to disastrous conclusions:

- 117. Power (boy 1): *laughter*. We can't.
- 118. Power (boy 2): Because we can't grow any more prawn farms so now you have just ruined the economy.

On the contrary, the other group celebrated the local, traditional solutions:

- 119. Jeganatthan (boy 2): [What we should do is] build rice farms because that is a very, effective traditional...

These excerpts from the central parts of the process of dealing with conflict (6.4.4) showed that the group did not manage to get through the situation of conflict and make sense of the multiple, interconnected aspects: issues of fairness, economic profits and environmental security. Strong emotions arose, and while they were caught in the middle of the conflict, students reacted with a sense of fear of the future, either by colouring it with images of immobility and failure (Power, 113), or by finding refuge in the perpetuation of the past and the tradition (Jeganatthan boy). At this stage, the group moved away from the goal of producing a path towards their *desired* future.

A similar situation was found in Group A, in which students found it hard to understand one another:

Just over the 2nd minute of recording:

35. Margherita (boy): well I believe that as many different species of wild prawn and fish are dying out I believe that it is most necessary for the future generations of children in India as you so kindly pointed out, that they survive off these fish in the mangroves and I am afraid that if the mangroves aren't there, there will be no fish for your children to survive on.

38. Dr. Krishna (boy2): we can largely boost the Indian economy using the prawn farms (...) and knock -a -lot- of -starvation- out-at the same time. There is clearly not enough fish under the mangrove trees to feed everyone, but there definitely is enough prawns to feed a hell of a lot of people.

In this exchange, there was juxtaposition between the concepts of 'Nature as a system of services', which encompasses the prawns and their ecological relationships within the environment, and the 'Nature as a collection of resources', which can be singled out, extracted and used. In this second vision the problem of food availability is solved by means of multiplication of one, main product item. Again the focus on prawn production becomes a form of reductionism, in which one thing should explain all the problems of starvation in India. There seems to be a need for the students involved in this discussion to expand the focus of their inquiry and, for example, look beyond the aquaculture ponds, to see other problems, such as the degradation of the land, the pollution of the water and the other people's voices. As was observed earlier for group C, this exercise of asking open questions and thinking together was difficult to do within a context of competitive talk. In addition, as an extension of this interpretation, it seemed that the two characters struggled to make the distinction between survival needs and economic interests.

6.4.5 Exploring motivations

After the initial exchanges in which students exposed their opposed views, students entered a phase of dialogue which displayed different features in each group. It is interesting to compare two main styles of talk, found in groups B and C. In group B the talk opened with an exploratory question: 10. Tami (girl): *why did you take up prawn farming in the first place?* The question addressed the character in role, and looked for reasons, and it differs from a question asked by one of the boys in group C, which looked for an argument:

99. **Power (boy1):** What is your argument against it, I just want to hear your argument about why we don't want this.

This comparison is useful to understand the two diametrically opposite styles of framing the discussion, namely the 'power-game' approach in 99, with the argumentative style, and the beginning of a cooperative exchange, marked by a question which aimed at gaining clarification. Group B appears as if had started to move along the path of resolution, and they touched, albeit briefly, on a common condition, such as risk:

32. **Shailesh (boy2)** Well prawn farming is like the easiest and quickest way to make money isn't it?
33. **Tami (girl 2) :** What happens when you can't prawn farm any more and the land gets more and more expensive because you [(unclear)]?
34. **Shailesh (boy2):** [then we will move on].
35. **Tami (girl2):** Move on to what?
36. **Shailesh (boy2):** Another prawn farm
37. *(the Tami boy giggles)*
38. **Tami (girl2):** Well you can't, because the land is too expensive for you to buy it now, from the government. What do you do then? So you have got nothing to fall back on. Do you think for the future?
39. **Shailesh (boy2):** No I am a prawn farmer. I don't think like that about the future.
40. [...]

The condition of uncertainty and precaution described at 33 made the different concepts of time emerge: the linear view of the prawn farmers contrasted with the continuum between past, present and future, expressed by the villagers. Yet at 35, the Tami girl used the future as a space of communal existence, in which both risk and opportunity can apply in the same measure to both groups: the use of a rhetorical question placed emphasis on action ('*So you have got nothing to go back on. Do you think about the future?*'). In this exchange, the speakers made large moves on the conflict resolution matrix (Figure 6.1), by trying to explore the space of the future. The task however was difficult. The sentence at 39 signalled that it was still early days for finding consensus and building their vision together, although they were evidently making progress.

6.5 Problem-solving

In the course of the task, the groups engaged with discussion of specific aspects of the controversy and they tried to find solutions. Analysis of those discussions was conducted to explore the extent to which practical solutions could lead the groups to find consensus.

6.5.1 Intensive farming

As a first example, students in group D devoted almost the entire time to naming solutions:

1st minute of recording, group D:

- 31. **Laura:** What about the fishermen? Erm they are fishing in India where the prawn farmers are working.
- 32. **Dharwar (boy1):** [Yeah the fishermen they lose].
- 33. **Sonja (boy):** [They should be given a subsidation, is that the right word?]
- 34. **Dharwar (boy1):** [Subsidity].
- 35. **Sonja (girl):** [Subsidisation].
- 36. **Dharwar (boy 2):** But isn't that a bit impractical?
- 37. (...)
- 38. *one of the boys makes a loud noise*
- 39.

Students in this group spoke loudly, which attracted my attention. When I approached them with my initial question, they reacted with answers and propositions rather like a 'think-tank' process. Some difficulties with the English language became apparent (i.e. 33, 34, with more instances found at 42; 61-62; 65; 103), and it was also noticeable that my interventions throughout the recording did not seem to help the group. As became evident in the transcripts, students were out of role and I was unable to bring them in their roles and remind them of the framework in which they were supposed to be working. The solutions suggested sounded like guesses 'out of the air', with no clear vision. The following passage gives further evidence: the girl and one of the boys would engage in short conversational exchanges but, overall, students appeared to concentrate on challenging one another, mainly out of role:

1st minute of recording, group D:

- 53. **Dharwar (boy 1):** [what about...]
- 54. **Sonja (boy):** [yeah but..]
- 55. **Dharwar (boy 1):** [Why can't they just get them] in the sea because that is where they belong?
- 56. **Sonja (girl):** Because there aren't enough.
- 57. **Dharwar (boy 1):** Well you should have thought [of that before].
- 58. **Sonja (girl):** [There] aren't enough in the places that we want; we want to have a concentrated place where we can just catch prawns, because if we have it in the sea we might catch dolphins or something like that.
- 59. **Dharwar (boy 1):** Yes but it is not very... it is a bit high intensity in itself, you know how much protein you would have to use, you have to use twice as much protein as the weights of their bodies, the farmers.

The boy at 44 made a proposition in the form of a doubt, a speculation, which hinted at the reasons for having prawn farming in the first place. The question effectively caught the attention of the group (there are no disturbing noises or overlaps), and the girl at 45 provided an answer which revealed the assumptions behind prawn farming - to increase the quantity of produce for human use, with a view of Nature as deficit. Through this kind of argumentative discussion, students in the Dharwar-Sonja group disclosed an important feature of prawn farming, that of being both capital and energy intensive (58). It also displayed the relationship between food production and energetic cost (as opposed to the most common perception of food as 'provider' of energy), by reporting a piece of information from the Guardian article they had read (59). By such means the group made a little progress in understanding the issue, but they still found it hard to reflect on new actions they could take together: discussion focussed on one type of solution (intensive farming) and students were mainly out of role.

In the other groups, the discussion of problems and solutions contributed to bring to the surface some of the students' assumptions about socio-environmental issues. Examples are given in the next sections.

6.5.2 Managing Nature

In order to deal with a contradiction, group A explored the risk and the opportunities of changing and modifying Nature:

4th minute of recording, group A

46. Dr. Krishna (boy2): [Well you are kind of contradicting yourself there aren't you Mr. Mr...bureaucrats].

47. Dr. Krishna (girl): no Margherita, isn't it better that we have prawns that are sort of designed to be eaten instead of just hunting for [wild prawns]

48. Dr. Krishna (boy2): [Play God] I say! Play God. What, how can we come to a s::: a sensible resolution of this [one?]

In this passage, Krishna displayed a cynical attitude towards the scientist (46), whom he called 'bureaucrat'. In this case, the student accused the biologist of being contradictory and perhaps unable in his view to frame the problem in a rational, acceptable way. This excerpt also shows an anthropocentric perspective which permeates the goals of politics, economics and science (47: '*the prawns are designed to be eaten*'). It is perhaps significant that the boy at 48 made an appeal to God and the word 'sensible' may give

an indication of the ethical dimension underpinning their discussion, which had been kept so far largely implicit.

6.5.3 Fairness

In group C, dialogue developed through a series of episodes of competitive talk. Girl 2 looked for a rational solution, by referring to an idea of fairness:

2nd minute of recording, group C:

86. Jeganatthan (girl 2): (*continues from her previous statement*) so basically we want to balance out the wealth and the living standards of the country not just make the gap bigger.

87. Jeganatthan (boy2): Yeah.

The excerpt showed that she adopted an explanatory tone, making skilful use of previously acquired disciplinary knowledge (i.e. geography or history) and her proposition seemed to suspend the conflict for a moment. It is also important to notice that her intervention was not in line with the Jeganatthan character she was playing, but it came across as more like the proposition of a mediator, putting forward reasonable principles.

6.5.4 Settlement offer

Students in group B entered a phase of searching for consensus. The Tami girl led the discussion, with the goal of persuading the prawn farmers to acknowledge their responsibilities:

4th minute of recording, group B

41. Tami (girl 2): Also, also I mean I take your point that you do prawn farming to make money because you can't, you can't do anything else because ehm you are in a similar position to us

42. Shailesh (boy1): [We had] to make money we have to feed our [children, we had to support our families].

43. Tami (girl 2): [yes we understand that, because we are in that position], but however –

The conversation then progressed in a cooperative form, with constructive contributions from the members:

46. Tami (boy): - The cyclones-.

47. Tami (girl2) : yes the cyclones and we now, the government isn't putting anything into place to change that.

48. Shailesh (boy1): Well that is the government's fault isn't it?

49. Tami (girl 2): Well you are helping it move [along].
50. Tami (boy): *[unclear]*
51. Shailesh (boy1): I know I am not helping the situation but we have got to make money to feed our families, to support our families and support the people like, if you really wanted a job you could ask me and I could probably employ you, that way you could get money and food.
52. Tami (girl2): But I don't believe in the ...justifications of that.

During the discussion, students achieved a first level of conflict resolution, through the acknowledgement of mistakes, and the offer of a compromise, based on specific interests (money and food). The refusal of the offer was expressed by an appeal to morality and an expression of disagreement, which ended into an emotional outburst, followed by a long pause (E2, 57-58). The same contradiction between interests and needs and the impossibility to compromise on needs was perceived by the students as an intractable moral dilemma, which no single person, solution or body could alone solve. In all groups, students reviewed a list of possible solutions, which are presented as follows, but it should not be surprising to see that such solutions would not be accepted until the groups were able to work together, with shared goals.

6.5.5 Expanding the resource base

A common and immediate approach to the solution of the conflict was to expand the resource base. This point was discussed by three groups:

- Group A looked for other geographical contexts in which to install the prawn farming (51, 80), an extra supply of money (53), and natural resources (e.g. water, 63-69).
- Group C was concerned with finding other industries/activities which produced revenues without the drawbacks of prawn farming (130, 134, 135, 142, 145), or
- Group B considered searching for money for setting up new businesses (53, 55, 60, 83, 84, 111).

An example will be given here for each of these points, to reveal how the students' collective thinking was moving in the direction of dialogue and conflict resolution. Starting with group C, the search for more money to replace the prawn farming business was accompanied by the search for appropriate 'expertise':

122. Jeganatthan (girl 2): [we should] maybe also use the money that we did make from prawn farming to invest in education so that India can build up a bigger ehm academic industry.

130. Jeganatthan (girl 2): More academically then everyone can think of more ideas to make more industry and it will be a good aspiring circle.

This passage shows the emphasis on finding knowledge and expertise on the outside, while denying for example the local knowledge that the farmers may hold. As a matter of detail, the girl was playing the character for only the first time, having previously swapped her role of adjudicator with the other girl and, as she had already mentioned, she did not believe in the reasoning of her character.

The other two groups concentrated on the search of scientific/technological solutions to deal with the shortage of water and land. Neither group however settled on a specific solution. For example:

5th minute of recording, group A:

51. Dr. Krishna (boy2): well, personally I think I know how we could achieve this, whole problem.

52. Margherita (boy): Yes do go ahead.

53. Dr. Krishna (boy2): Why don't we (...) set up these sorts of prawn farms in different countries and import them into India.

54. Margherita (boy): Ah but surely you can see that, consider the costs of this.

55. Dr. Krishna (boy2): We need money from aid companies I say.

56. Margherita (boy): But that is draining them (Krishna giggles),

5th minute of recording, group B:

70. Tami (boy): Anyway I was just wondering why couldn't we separate the seawater by ehm making water and salt.

71. Adjudicator: (unclear)

72. Shailesh (boy1): Couldn't you just sieve all the water before it goes in?

73. Tami (girl2): [Yeah but that would...]

74. Shailesh (boy1): Yeah just get a big massive sieve yeah and sieve all the water.

75. Tami (boy): No that will work, but you have to wait for it to evaporate though

76. [...]

77. Shailesh (boy1): Yeah but you could have a big evaporating machine. (laughter) I don't know, you could have like a kind of condenser.

78. Tami (girl 2): Why all just let them to get married and they could live happily, nicely

Interestingly, in both groups, students seemed to refuse to settle on simplistic solutions. For example, in Group B the conversation continued to unfold, with the boys reinstating their beliefs. The dichotomy between human concerns (i.e. 'we need alive children') and environmental concerns (i.e. 'we need wildlife reserves') became even more apparent, until the boys faced a second contradiction - water (65: Dr. Krishna: 'I think

we need fresh water from somewhere, fresh water '). This contradiction emerged after a pause, which seems to indicate that a process of thinking was emerging from the juxtaposition of viewpoints. The identification of the water problem made the group revert back to the search of a specific solution:

6th minute of recording, group A:

- 70. **Dr. Krishna (boy2):** and turn and eliminate the salt and turns it into fresh water, like they have in California. So I say that we have that and then ...prawn farming solution solved ...apart from the ... destruction of India obviously.
- 71. **Margherita (boy):** No well what I believe is: you would like the children of India to be happy at this time, free from poverty and all that stuff, and I would like my fish to have their mangrove trees so I say you develop it as much as you want, but please...
- 72. **Dr. Krishna (boy2):** (*giggles and continues the sentence*) ... Leave our mangrove trees alone.
- 73. **Margherita (boy):** Yes, leave them damn right there okay?

The excerpt shows the difficulty for the group of reconciling opposed principles, and the students kept interacting antagonistically. Later in the discussion, Dr. Krishna pointed to the need for a different way of thinking: *'so find me a solution where we can keep the prawn farms in... (74-85)'*. The group kept on going back and forth between specific solutions and interventions, but did not find a way out of their dilemma.

In sum, the search for specific solutions confronted the groups with the numerous contradictions at the heart of the controversy and the conflict. In particular, the later discussions on expanding the resource base to respond to the needs of the local populations, and in response to a principle of fairness, lead the groups to offer a few solutions, none of which appeared to be completely satisfactory. In some passages, it appeared that students held an internal awareness of the great complexity of the issue they were facing and the need for further thinking and discussion.

6.6 The cooperative action

After the problem-solving process, students in each group began to think of actions they could take together. There were differences in the way each group managed to perform dialogue in this phase, depending on the students' ability to express themselves in role, and their capacity for active listening. Examples are given in the next sections.

6.6.1 Unpacking beliefs

In group C, the intervention of the senior researcher was important to reveal the contradictory images held by the group members on the meaning of development (senior researcher: *'Do you actually need all this money that we are talking about? Why do you need the money?'*):

5th minute of discussion, group C:

- 151. Jeganatthan (girl 2): To develop the country and have enough food to feed everybody.
- 152. Power (boy 1): So we can be rich and buy lots of stuff.
- 153. Power (boy 2): exactly, that is great yes.
- 154. Senior researcher: Developing the whole country, do you mean roads and hospitals and industry?
- 155. Jeganatthan (girl 2): Generally yes. The general standard of living.
- 156. Priscilla: [no but, Amanda, Amanda, Amanda]
- 157. Senior researcher: [Or do you mean food] because you are growing prawns a bit smaller perhaps?
- 158. Priscilla: Amanda, we are meant to be uhm...teaching people the way Ghandi people taught us to live.
- 159. Jeganatthan (girl 2): Well I am not agreeing with that.
- 160. Priscilla: yeah, but that's you.
- 161. Power (boy 1): hey! *Makes loud noise.*

The interaction with the researcher brought to the surface the confusion between needs (food) and wants (buy a lot of stuff). The question at 154 aimed at unpacking students' conceptions of development, which had not yet been questioned. The intervention of the other girl who should have originally taken on the role of Jeganatthan was helpful to give voice to the alternative vision, and it also showed how such vision had not been considered by the group, and dismissed.

6.6.2 Convergent thinking

After the intervention of the senior researcher, the group started considering solutions which extended into the future. This triggered a sequence of constructive moves between the two boys who had been so far the main speakers, to gradually include the whole group. The following excerpt is an example of consensus building:

5th minute of recording, group A:

- 87. Margherita (boy): I know what we could do, we could instead of doing big industrialised prawn farms (...), we can make a, we can increase the awareness of the local people of how to prawn farms, farm prawns...
- 88. Dr. Krishna (boy 2): *(continues the sentence)*...in a safety way
- 89. Margherita (boy): in a safe environment that will maintain the ecological...

90. Dr. Krishna (boy 2): ... balance
 91. Margherita (boy): balance of the natural environment.

Then the students made recommendations and engaged in deliberation:

97. Margherita (boy): The profit is then going directly to the villagers, which means that there will be no famine.
 98. Margherita (girl): ok

The argument was constructed around the idea of safety and precaution which includes natural equilibrium as well as human safety and equity. In the process of thinking together, the secretary (Dr. Krishna girl) checked the genuine viability of the solution, by asking questions:

103. Dr. Krishna (girl, as secretary): Doctor Krishna are you happy with this for the children, will they get enough protein this way?

At this point the intervention of the senior researcher set the group to think even further, helping them towards a joint proposition. In the end, after the argumentative exchanges of the conflict resolution, the group displayed some friendship talk:

116. Dr. Krishna (Girl): Where are all these long words coming from?
 117. Margherita (Boy): They've just like built up in Max's mind.
 118. *laughter*

6.6.3 From technology to precaution in the thinking of actions

As with previous groups, this group entered a phase of critical thinking in role: students expressed their reasons and their personal conditions, and then explored alternatives to prawn farming. The process was initiated by a rhetorical question, which invited the group to take joint action, followed by a series of conjectures:

4th minute of discussion, group B:

67. Tami (girl 2): So what are we going to do?
 68. (...) Shailesh (boy 1): but
 69. Tami (girl 2): because eventually prawn farming can't go on forever like because of the land and if it is slowly like hurting [people like us].
 70. Tami (boy): [No but the point is that] if the companies are not actually getting any money why don't they re-use the land?
 71. Shailesh (boy 1): Yeah they could [like get some...]
 72. Tami (girl 2): [Because they can't] because it is embedded with salt and chemicals.

Students are here working together on clarifying the issue of the land, responding to the contribution made by the Tami (boy) at 70. However, only the girl is consistently using the first person. While she talks in role, she puts emphasis on the irreversibility of the damage (72), and the personal costs associated with it, which makes a persuasive invitation to re-think the group's actions in a way that goes beyond immediate concerns. During the discussion, the group became aware of the limitations of resources such as water, 80-81, and the scale and costs of the damage (83):

- 81. Shailesh (boy 1): fresh water is common
- 82. Tami (girl 2): no but it is not that common where we live
- 83. Adjudicator: so it's this eh...[ehm]
- 84. Tami (girl 2): and the soil is like completely penetrated with chemicals and stuff so it's not being able to use it, so they could like excavate it, bring all the soil up, couldn't they, but, but that's will [cost a lot of money]

This led the group to spell out the relationship between values, interests and actions:

- 110.Tami (girl 2): Doesn't that completely go against what you said before though?
- 106.Shailesh (boy 1): No because if there is another industry with bigger money in it then obviously I would do that. ... And obviously if we like didn't put our lives into [what other people have made]

In this framework, the simple techno-scientific 'solutions' accounted for very little of the group's thinking (as was suggested in section 6.5.5). Instead, the discussion unfolded with both parties engaging in thinking of new actions, in a climate of possibility and suspension of disbelief:

- 132.Shailesh (boy 1): But what would you do? How would you do it?
- 133.Tami (girl 2): eh, I want, I think prawn farming will have to carry on because it does provide money for , eh, the country, even though I don't necessarily believe in it, however I think that possibly if we could minimize it into a smaller scale than it is at the moment and uhm...
- 134.Shailesh (boy 1): Or put everything into the same place instead of spreading it around.
- 135.Tami (girl 2): Exactly. (...) And uhm... work on another trade, and I know it will cost a lot of money but it might, it just depends, because you people are gonna [compromise]
- 136.Shailesh (boy 1): [in the long run though]
- 137.Tami (girl 2): yes ! and people might even fund it!, I mean, in the long run it will work out better because after the prawn farming has finished the country is going to have nothing to go back on and it is gonna like, there is going to be like a big economical disaster.
- 138.Shailesh (boy 1): that's true yeah
- 139. (...)
- 140. Tami (boy): So anyway is there any more important issues?

In many respects, the outcome of the discussion for this group was similar to the deliberation of group A, but it was elaborated in a climate of greater doubt and uncertainty, with more emphasis on the future (i.e. *'they might even found it!'*). At 133 the girl is trying to make different points of view fit together and this requires the ability

to deal with something that is desired but far from certain: note the attempts being made through the conditional tense ‘possibly’ (133), ‘might’ (135 and 137).

In sum, the resolution of the conflict in the four groups appears to have ended with different outcomes. The results of the analysis of students’ discussions in section 6.4 displayed students’ different approaches to the task, ranging from the desire to win over the others to an attitude of dialogue. In addition, the results of section 6.5 showed that the simple naming of solutions was not sufficient to settle the issue, and find consensus. Dialogue through conflict was described as a complex exercise, involving knowledge, values and beliefs. In section 6.6, the analysis showed how students in groups A and B performed dialogue through role-playing. What follows is a selection of excerpts from students’ presentations at the end of the task. The analysis of this final part of the transcripts is important for understanding the impact of the conflict resolution activity on students’ conceptualisation of the conflict (and for adding validity to the analysis of students’ discussions).

6.7 Groups’ presentations

6.7.1 Group C: failure to reach consensus

In the end, group C failed to reach consensus. Their talk ended into an off-task event in which the students talked somewhat randomly about anecdotal events and curiosities about folklore and culture of other countries (India, Egypt but also Wales: 210-211). During the final presentation, the group presented a number of ideas for tackling the issue, which were the result of previous discussions:

Girl 2: Okay. All that Paul Power want is money. They don't really care about how they do it so we thought about investing money in the Indian people, education and stuff or uhm, like turning the prawn farming to rice which could also benefit the Indian people for food and they could farm it and other forms of farming could benefit both from the American corporations and can get money and so the Indian people.

Interestingly, no distinction seem to have been made between interests (i.e. revenues, for the Paul Power group), needs (i.e. food, for the Indian people), and power imbalances (i.e. the problems of the land). Eventually the group managed to consider many aspects of the issue, but they had difficulties in finding a way forward through consensus.

6.7.2 Group D: failure to enact dialogue

In their final presentation, this group looked at ‘techno-fantastic’ solutions for engineering prawns:

Sonja (girl 1): (*continues*) of farming to other things like (*the secretary joins in*) cucumbers, (*the girl continues*) and uhm but, me and Frances have decided that there isn’t much protein in cucumbers and then John decided on ...

Sonja (boy):...Prawn-o-cumbers which is a mix of half prawn and half cucumbers so you get A. the hydration from the cucumber and B. protein from the prawns and you don’t mess up all the, what are the trees called?

Girls from other groups (Tami): Mangroves.

In line with the nature of the discussion that the group had conducted, the presentation featured the same sense of lack of coordination: the girl is able only to list what each other member had said, without any coherence or consensus. The search for a magic solution for the prawns was also a rather simplistic outcome for their discussion.

6.7.3 Group A and Group B: cooperative solutions

In their final presentation, students in these groups found consensus. For group A, it was the idea of fairness, which students expressed as ‘fair trade’, that led them to agree:

Dr. Krishna (Girl): ... we ehm both came to the conclusion that we want to start fair trade with our share of the interests with the villagers what they are going to be like, so we came to the idea that we are going to teach the villagers how to farm their own prawns and their fish and then we are going to sell that off instead and we are not going to involve any American businesses at all or the government because we are going to be tied to fair trade and then we are going to use the fresh water we use for prawn farms...

Dr. Krishna (Boy): We are going to use the fresh water used for prawn farming for irrigation on plants with protein so there will be no water problems to grow crops.

This shows how the group moved from the preservation of personal interests to the consideration of practical actions they could take together in the physical and social context. While the concept of fair trade was mainly related to economic shares and interests, an element of fair distribution and use of natural resources (i.e. water) was also considered. By such means, students found together a way to move through the conflict.

Similarly in group B, dialogue ended with consensus and thinking of actions, which suggested that the characters were working within a common framework. In this group, the adjudicator did not act as a judge or a mediator. The girl noted down the content of

the discussion and she listened to the group members, then to present a decision which was the result of the cooperative effort of the group:

141. **Adjudicator:** so if the government did, okay so a good idea: the government should concentrate on a trade industry for the long term because the prawn farming, we understand that prawn farming is an important factor (unclear).

In this group, consensus seemed to bring some strategic competence. The following excerpt shows that students went beyond the issue of prawn farming itself by considering similar patterns in other environmental issues:

144. **Tami (girl12):** It is like when they cut down all the rainforests they didn't think what sort of consequences there were going to be and now...
145. **Shailesh (boy1):** Yes that's true and now it's like they have realised it haven't they.

During the final presentations, the group did not achieve a final deliberation, but reflected on the scale of the action that was required (i.e. International scale):

Tami girl: although prawn farming is important we could take up something more long term really better like um not cucumbers, like rice but we did also have a point that rich countries like China for instance wouldn't, is that right, big countries like China wouldn't need to buy any rice and also rich countries don't really want to buy things like rice they want to buy things like delicacy foods like prawns.

In their discussion, students seemed to have been able to start thinking about the local and global connections in socio-environmental issue, and touched upon the issue of people's personal behaviours.

6.8 Summary

Sections 6.1 to 6.7 described students' reactions to the conflict, and their progression towards resolution. In line with Galtung's (1996) definition of conflict, students were confronted with the difficulty of dealing with an intractable situation, in which two parties pursued incompatible goals. Table 6.B below summarises the developments which had taken place in each group, and the interactions between the characters. The table shows the names of the group (first column), the duration of talk (fourth column) and three levels of interaction, corresponding to sections 6.4, 6.5 and 6.6 of the analysis.

Table 6-B Groups' progression in conflict resolution

GROUPS	1 st level: Reacting to conflict (6.4)	2 nd level: Problem-solving (6.5)	3 rd level Cooperative action (6.6)	Total duration of talk
A Krishna- Margherita	K: <i>'ok Dr. Krishna, what do you believe?'</i>	M: <i>'I know what we could do. Why don't we set up farms in different countries...'</i>	M: <i>'the profit is going directly to the villagers which means that here will be no famine'</i>	6'
B Tami- Shailesh- Goshivah	S: <i>'we could employ you...'</i> T: <i>but is wrong, it is morally wrong!</i>	T: <i>'I don't believe in the justifications of that...'</i>	S: <i>'but what would you do? How would you do it?'</i> M: <i>'... I think if possibly we could minimise it to a smaller scale than it is at the moment...'</i>	8'
C Jeganatthan- Power- Priscilla	P: <i>'we are for and against'.</i>	J: <i>'your prawn farms are useless'</i>	-	Circa 8'
D Sonja - Dharwar	D: <i>'Bruce is the secretary here'.</i>	S: <i>'We want natural food! We don't want GM!'</i>	-	4'

As displayed in the table, the analysis looked at the groups' success in finding consensus, on the basis of a number of factors: the ability to talk, the ability to express oneself in role and the active listening of one another. The analysis of the initial exchanges in 6.4 showed that being in role was a difficult task for the groups, and only groups A and B showed an interaction between roles right from the start. The analysis pointed to different language strategies, which included both argumentation and dialogue.

It was also interesting to look at the combination between argumentative talk and content of talk. When the parties argued for incompatible goals, such as growing the economy versus guaranteeing benefits for the local villagers, they singled out specific resources for which to compete (i.e. water, land), or pointed out to specific solutions (e.g. growing the economy, increasing employment and wages, reverting back to traditional agriculture). None of these specific options however helped the parties to find consensus - the problem seemed always too complex to be addressed by any single option.

In contrast, when the groups reached some form of resolution, elements of rephrasing what the other had said, efforts to persuade the other person, cooperative exchanges and

mutuality were recognised as features of this talk. There were also different degrees of resolution. For example, group C the outcome was mainly a compromise on different businesses as a way to gain more revenues; in contrast, in the other two groups A and B, students were more capable to look at the local and the global contexts.

In conclusion, students began to engage with the concept of economic and scientific development and began to question it. This approach to environmental issues is in sharp contrast with the fantastic images of sci-tech solutions, i.e. as suggested by group D, and begins to show that discussion in role may put students on the path of thinking about personal actions and behaviours, and gain some general lessons from the specific activity.

In the questionnaire analysis that follows and in the final discussion in Chapter 7, I will come back to this point, to suggest that role-play can be used to support students' understanding of complex socio-environmental issues, which raises some key questions about the nature of science learning and teaching in the classroom.

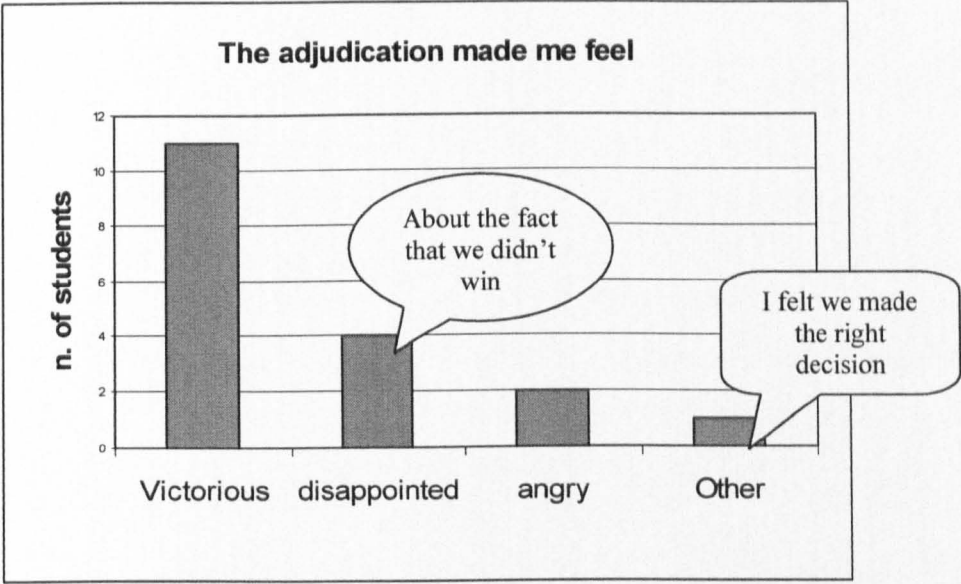
6.9 Results from questionnaires

Questionnaire 2: 'A few lines for something that I wanted to say...'

After the conflict resolution activity, this questionnaire was aimed at gathering students' own perceptions of the task, their satisfaction about group work and their ability to deal with conflict. Eighteen students answered the questionnaire.

Starting from the first question, '*The adjudication made me feel...*', students' answers confirmed that the adjudication had generated a divide between winners and losers. Students felt either victorious or disappointed, two students felt angry (Figure 6-2). Two students added some additional comments (in the bubbles on the chart), pointing to the existence of competitive attitudes in the debate:

Figure 6-2 Feelings after the adjudication



- In the second question, *'Now what I feel is'*, students were encouraged to select from a given list all the options they felt were relevant to them and to their feelings after the activity. Their answers suggest that after the conflict resolution activity they felt more positive about the issue. One student was still angry and two additional comments seem to suggest that students were still looking for a resolution. In some way, this appears to match with the results of the discussions, and the fact that one group got stuck in the conflict and did not achieve resolution:

Positive about the future:	13
Willing to take action:	9
Angry	1
Other:	'that action needs to be taken' (adjudicator)
Added comments:	
*Positive about the future: we're going to sort it out?	
*Willing to take action to come to a compromise (adjudicator)	

- For the third question, *'There is something that I wanted to say and it has not come up...'*, ten students did not give an answer. Four students made comments on the decision-making process, reiterating the need for a resolution and four additional comments communicated a sense of students' detachment from the task:

No answer	10	/
Comments on the process of finding the solution	2	<i>That it would be great if the pro and cons for prawn farming could find an equilibrium; we need to think about the future;</i>
Comments on the issue	2	<i>the impact of unemployment on local people; the government should've lowered the price of the prawns for the villagers so that they could've benefited from the protein;</i>
Other responses:	4	<i>That prawns are tasty; I really love prunes; oh well; make prawnstars;</i>

Again, this seems to match with the results of the analysis of students' discussions, in which two groups (C and D) either failed to reach consensus or did not fully participate in the dialogue in roles. It is also interesting to note that the four students who commented on the resolution process were still bringing their comments to the questionnaire, showing they did not completely disengage from the activity.

- In the fourth question, '*I think that the best idea for conflict transformation activity was*', students listed a variety of solutions, touching upon ideas expressed in discussion, as well as new ideas, such as sustainability. The ordering below shows the students' efforts to find solutions and approaches which would serve India's interests in the global context:

Combined, sustainable solutions	2	<i>continue prawn farming and irrigate soja fields with the water, because it is sustainable;</i>
Fair trade	3	<i>Fair trade because we agreed; Fair trade because it suited everyone; Our idea of fair trade because it benefited both groups as we were all concerned of the villages and their protein;</i>
Investing for the benefit of the country (India)	3	<i>Investing in rice farms because it benefits the Indian people and the economy; to invest in rice farming instead or using the prawn farms for education because then the country will benefit as a whole; Educating the kids;</i>

Other students touched upon the need for fairer and more equitable forms of development:

Equity and Fairness	1	To talk about it then find an equilibrium because it would be a compromise for everyone;
New forms of development	2	For India to invest in another industry because it would benefit more people (adjudicator); To find alternative business and employment for workers because everything was a bit ridiculous;
Other answers	2	To prune farms because it is prunealicious; Ours because it made sense;

Questionnaire 3: ‘After thoughts’ (three weeks later)

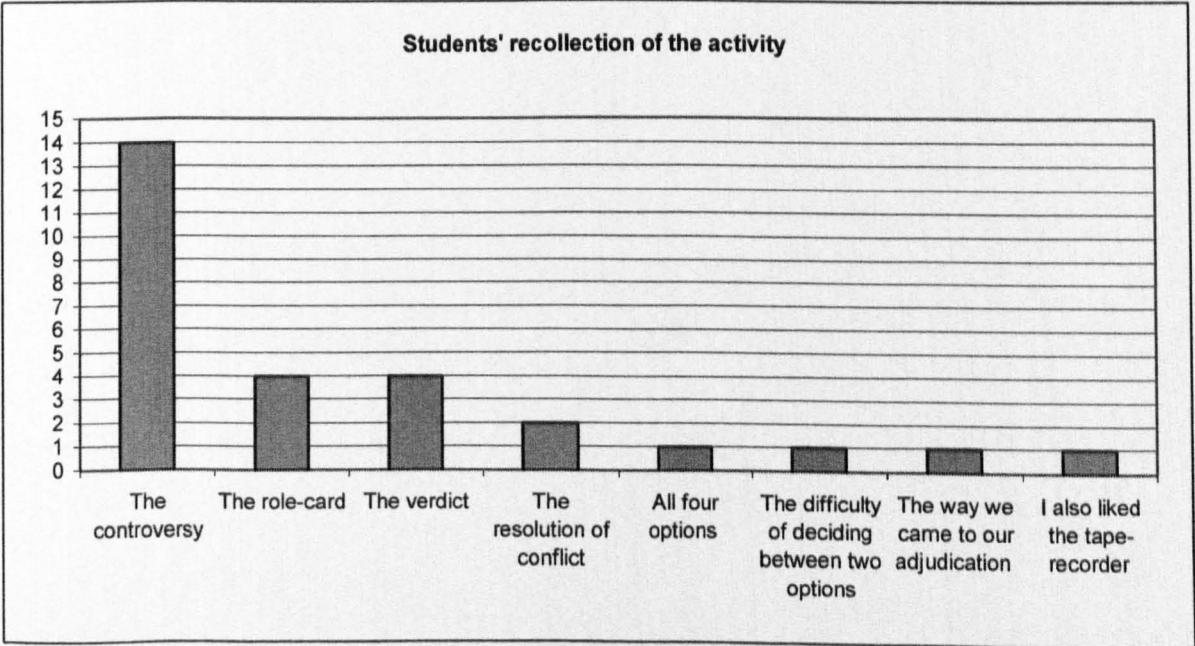
Students’ answers to the questionnaire administered three weeks after the activity revealed a number of features of student learning. Twenty students completed the questionnaire.

- In the first question, *I have been thinking about the role-play since we did it*, six students indicated that the activity had triggered some further thinking:

Yes: 6 No: 14

- When they were asked to specify what they ‘*remembered most about*’, students’ answers indicated that the activity was memorable. The controversy stuck in their minds, followed by the role-card and the verdict. As shown in the Figure 6-3 below, some students also indicated the resolution of the conflict as a memorable part:

Figure 6-3 Students’ recollections



- When students were asked to comment on their learning, the first question *'From this experience I learnt to....'* generated a variety of answers around the theme of communication, self-expression, and the opportunity to listen to others:

To argue and debate

- 7 *Gather the information given to me and to argue my case effectively using this information;
Argue with people and where prawns really come from (prawn farms in India);
I got to practice my arguing skills that I had already learnt;
Debate under pressurised circumstances;
Talk about a subject I knew very little about in a convincing way;
Not believe everything people tell you in an argument;
Operate a cassette recorder and argue viciously and aggressively so that I win the argument;*

To express myself (in relation to others) and practice my role-taking skills

- 7 *Effectively put forward and arguing my case to try and persuade the opposing sides;
Pick important points from lots of information (on sheets etc...) and practise my role-taking skills and how to pick out relevant points in presentations of others;
Argue my case a bit more and persuade a bit more. I also learnt more about my fellow class mates;
There are a lot of views about issues and it's hard to get your view across;
Act as someone else from only knowing what they are like from the information on the card. Speak up for what I was 'told' to believe;
To be Dharwar the head villager (I admire him);
Argue from someone else's point of view;*

To listen to others

- 2 *Listen carefully to the opinions of others;
Listen to an arguments especially those I would automatically have assumed weren't the right opinion/argument;*

Formulating an opinion/being interested in a new topic

- 7 *There are important things going on in the world that I don't know about. I learnt more about things going on in India and how to have an opinion on them;
About all the problems and that it is hard to know what is right and healthy to do for everyone;
Even when someone gets around to helping situations it isn't easy, there are always cons!
Think about prawns;
Consider where certain products come from + how they are bred;
Find out important facts on what is happening in the world and how prawn farming is a major problem;
Prawn farming is a serious issue and not a laughing matter;*

- In the last question, *From this experience I learnt that....*, students showed they had learnt about the topic and its social relevance, and they also showed some understanding of the relevance of the specific issue in everyday life, for example:

Facts about prawn farming and its problems	<p>14 <i>Know things about prawns in India;</i> <i>Prawns are a large issue in India;</i> <i>Prawns are a good source of protein and are super good when mixed with cucumbers;</i> <i>Prawn farming is a big business;</i> <i>Prawns were farmed in mass in India harming the surrounding environments;</i> <i>It is a big problem;</i> <i>Prawns are living in India and that they are small + pink;</i> <i>Although prawn farming benefits the Indian economy it does not benefit the community or the environment;</i> <i>Indian farmers cannot fight the evil American companies;</i> <i>Mangrove trees are an important part of the place's ecology</i> <i>American business men put wealth before welfare;</i> <i>Prawns are tasty for Indian people that are poor and eat leaves for breakfast;</i> <i>Prawns are not always caught in the wild;</i> <i>The destruction and problems of prawn farming for the environment and local people;</i></p>
Implications for real life	<p>4 <i>There are things such as prawn farming going on in the world without my knowledge of it happening;</i> <i>There are many unfortunate conflicts around the world beyond what we see in the news;</i> <i>Prawn farming and its controversy are an issue in India. I also learnt that the job of adjudicator is very difficult;</i> <i>There is a lot of controversy surrounding prawns!</i></p>

In sum, the results obtained from the analysis of students' discussions and the questionnaires suggested that students had engaged with the activity and remembered much of it. The results of the questionnaire resonated with the analysis of the conflict, showing that students had moved from their initial feelings of disappointment to a better sense of satisfaction, although some students were still looking for a compromise or resolution. Finally, the analysis of the questionnaires showed that students picked up upon different aspects of the activity, ranging from the skills of argumentation to the ability to listen to others and persuade, although the latter was mentioned by a smaller number of students. Such results need to be discussed in light of the overall findings from students' discussions, and bearing in mind the novelty of the activity for students: students seem to have been able to engage at different levels, using their previous knowledge and abilities. In the final chapter, I will examine in more detail how this kind of learning can be taken forward in the science classroom.

7. Discussion and conclusions

7.1 Introduction

Drawing on the evidence gathered in the pilot and main studies, this chapter brings together and discusses the findings from the overall investigation. The first part of this chapter addresses the research questions first identified at the end of Chapter 2.

Discussion here is focused on the learning processes underpinning students' participation in the role-play – both as individuals and members of a group.

Intersubjectivity and creation of meanings are key aspects in the development of competences, which reflected dialogical, reflective and epistemic processes of students' engagement. The second part of the chapter is reflective in nature and concerned with further theorising on the role-play experience. Drawing on the evidence that was gathered, discussion focuses on methodological and epistemological considerations. Role-play is proposed as a strategy for educating citizens to deal with complex issues, with important implications for science education.

7.2 Answering the research questions

As outlined in previous chapters, the validity of a role-play activity depends upon the degree of participants' involvement, which in turn, affects their learning from the experience. In this activity, students were required to engage at all levels: social, emotional and cognitive participation in group activities. This discussion is concerned with understanding the learning processes that occurred and to discern some common themes. The first question introduces features of social interaction – in pairs and small groups – which are linked to cognitive processes of information-seeking and knowledge construction. Talk in friendship groups is then contrasted with interactions in conditions of conflict, to uncover emotional and cognitive dynamics of students' learning. The overall purpose of this first part of the discussion is to clarify the feedback that shaped students' learning through the experience. In answering the research questions, I will consider the competences that were developed, the nature of the relationships established by the students and the opportunities for personal and critical self-reflection, setting the basis for the second part of the discussion.

Q1. What are the most significant features of students' discussions?

As indicated in Chapter 3, students were first arranged in small groups to work together on role-taking. The accommodation of new perspectives and the interpretation and acceptance of the position of the character were the central aspects of the task, which were studied by keeping a focussed attention on consensus. Findings from the pilot study indicated that students in role worked towards expressing themselves by means of a collective voice, verbalising and sharing in group their motives and intentions. For example, as a group, students would express themselves in the first person, and made appeals to moral values: "*We are not money-makers, we are good people*" (Chapter 3, section 3.4.7). In contrast, when they made use of the third person, they were out of role. Students talked around the main issues involved, but they appeared more like spectators in a drama, commenting on the lives of the people and their problems, at a distance. The main message gained from the analysis was that working effectively in groups was important for involving students in the activity. Aspects associated with role-playing were a sense of agency, cohesiveness and participation, manifested with the use of the first person -"we".

Evidence provided by the questionnaires in the pilot study also indicated that students remembered the activity and the topics, and this included elements of the beginning of an awareness of the wider context and implications of the issue. For example, one comment showed that students had been exposed to a situation in which they could develop some awareness of the global connections related to food production and consumption. To quote one student: "[in this activity I learnt to] *question how exotic foods arrive on my plate*" (Pilot study, Questionnaire 3, section 3.4.12). Such findings were used in Chapter 3 to clarify the relationship between role-playing and internal consensus, with some evidence of students' conceptual and ethical development. As indicated in section 3.4.15, communication and collaborative thinking were generally observed as core processes in the development of a point of view, and were taken as the starting point for the implementation of the activity.

Drawing on the work of Billig (1987), the findings of the pilot could be mapped out as the first moves of an activity of role-play: in the enactment of a point of view, values and beliefs were elicited and communicated to others with the intention of affecting other people's points of view and actions, i.e. they were communicated with the

intention of *persuading*. This was discussed in Chapter 2, through the works of Petty and Cacioppo (1986), which showed the influence of people's knowledge, beliefs and context in the negotiation of meanings. When applied to these findings, students' engagement in the process of persuasion meant that during the activity they were participating in the negotiation of meanings, and the uncovering of assumptions, in a way that involved both social and cognitive aspects of students' learning.

In this view, the emergence of *patterns* of talk, as observed in Chapter 4 in the main study, can be interpreted as characteristic features of students' participation. As reported in excerpts 4-A and 4-C, a girls' pair and a boys' pair talked through interconnected interchanges, reading and discussing the materials. It was important to notice that, in both cases, social features were linked to cognitive processes. At several points in their exchanges, the boys made active use of their existing knowledge, i.e. in 4-C students referred to something they had learnt in history, to draw a parallel with the issue of prawn farming: "*ehm the British Government boosted the illegal trading of opium because it boosted their economy*" (main study, Jeganathan 148). This was also an interesting example of how students managed to retrieve learning from other disciplines and contexts, to make sense of the issue. In line with the work of Higgins (2000), mentioned in Chapter 2, the process of taking on a role and developing a point of view involves cognitive features and prepares students to handle difficult tasks, such as the meaningful selection of data from a variety of disciplines and sources. Additionally, in line with Lyle (2002) and Taylor (1985), students did more than just describing the problem: they actively sought to contextualise knowledge and events in the wider socio-cultural framework. The ability to express one's own ideas and exchange interpretations was generally an opportunity for students to gain knowledge from the process of interaction and to engage with dialogical competences.

A significant feature of pairs' talk was the use of language for negotiating power and shared priorities. The analysis of the boys' talk showed a style of turn-taking, which was a means for students to scrutinise information and develop their argument. By contrast, analysis of the girls' talk seemed to convey a sense of shared emotion and authority. In this second type of talk, there was evidence of episodes of chorus (4-E, on page 121). This was taken to suggest that while the girls initially engaged in a struggle for power, their patterns of thinking and communicating were later developed as instruments for working together as a group (4-G, on page 124).

Hence from a cognitive perspective, both styles of discussion led to critical understanding, suggesting that the way discussions were set up was a key factor in students' learning. In this case, familiar relationships appeared to support participation and the emergence of patterns.

The emergence of a gender dimension is important also for reflecting on issues of validity of the study. The clear distinction between the argumentative pattern of the boys and the cumulative talk of the girls was in line with the findings from studies in socio-cultural theory such as Mercer (2000) and Jerome and Algarra (2005). While it was outside the focus of this research to look specifically at gender, such similarity of findings can be usefully understood as an aspect of the naturalistic dimension of role-play. Students in the role-play participated by bringing their own attitudes, abilities, and patterns of thinking. These were elicited through language and could be observed. One implication of this is that role-play provided an opportunity for practicing skills and abilities – an interpretation confirmed in the questionnaires 3, reported in Chapter 6. At another level, the display and use of a variety of approaches to discussion is also an indication of the nature of knowledge production processes within the classroom. Different methods and styles of knowing are shared and used by the students in the class (I will further expand on these aspects at different points in the discussion). The analysis so far reveals that significant features of students' discussion include some characteristic patterns of participation. There were examples of meaning-making, drawing on students' personal values, knowledge and beliefs and examples of different ways of approaching consensus. Reflecting on the difficulties encountered by the students in what follows throws some light on some of the critical features involved in role-playing.

The transition from pairs to groups, a feature of group discussions in Chapter 4, was crucial to understanding students' attitudes and their reactions to the task. For example, in excerpts 4-F and 4-B, students in mixed gender groups did not manage to overcome episodes of dissent and to handle power and leadership. By contrast, when group work was successful, as in 4-F and 4-H, students engaged in a type of exploratory talk, characterised by creation of newly shared meanings. This included the formulation of metaphors to explain newly formed connections and conceptualisations of the problem: i.e. *"so it is just like a big cycle"* (4-F), and the effort of linking scientific information with the dimensions of action and belief, hence teasing out some of the assumptions

underpinning action: i.e. *“it is just better development. That is something we would sort of believe in”* (4-H). This type of exploratory talk was contrasted to other types of consensual discussion. The adjudicators for example, managed to look at the main problems caused by prawn farming, but as they became challenged by the complexity of the messages, they settled on quick agreements. While the adjudicators managed to get the discussion going, they did not seem to have really acquired the perspective of their characters. One of the problems in this case was lack of critical assessment of the information. In addition, another type of problem in small group discussions related to conflict, which originated from power struggles within the group (i.e. 4-P, on page 131).

Hence, drawing on the analysis of small group discussions, findings from Chapter 4 pointed towards opportunities for students to develop further the quality of discussion and consensus, as well as the importance of students' preliminary abilities, with the suspicion that students might not be accustomed to discussion, lacking the necessary pre-requisites. The generally limited display of patterns of talk also points to possible tensions within the class, or perhaps rare opportunities for working in a climate of sharing and friendship within the class. While recognising that children become friends in the course of their school time, the evidence gathered did not suggest that pupils found it easy to work collaboratively. Hence being in 'friendship groups' did not necessarily mean being able to work collaboratively. In this regard, the role-play activity was making a demand on students, in asking students to make use of friendship for doing classroom work. For example, the generally relaxed climate of the off-task episodes reported in the data can be contrasted with the tensions and the difficulties of the on-task periods. As a result, the potential for sharing knowledge and variety of methods for knowing, introduced by the role-play, appeared to be constrained by the existing social dynamics.

This type of discussion is in line with the works of Giroux (1997) and Dehler *et al.* (2001), as reported in Chapter 2, which supported a type of learning based on critical understanding and development of a point of view within a context of power sharing within the classroom. Working in small groups – as evidenced in students' discussions – appeared to symbolise some of the dynamics involved in knowledge-formation (epistemology), within socio-political settings. Both the successes and difficulties encountered by the students indicated that a number of different competences were required to engage with a complex, socio-environmental topic in the classroom.

That being said, an important ingredient for a positive development was the high level of students' interest; in the main study there was no significant evidence of boredom or confusion. The evidence presented in Chapter 4 supported the recommendations made by Duveen and Solomon (1994), about the use of questions at the bottom of the card to initiate and support talk. In a small scale, qualitative study such as this, such results are important and point towards looking further into the mechanisms through which knowledge is constructed by the students during the activity.

In Chapter 2, I explored the work of Lidar *et al.* (2005), which linked students' learning of scientific concepts to meaning-making processes and knowledge construction in the classroom. Students' learning was studied from the point of view of the interaction moves, and in that sense, 'good' moves helped students to recognise the next steps in their inquiries and to build on their previous reasoning. What was observed in the study of Lidar *et al.* was not so much whether students made pronouncements that were in line with accredited scientific knowledge, but if they were *progressing* in their task. The authors looked at whether students were finding the task motivational and meaningful, and if they were encouraged to gather more information or data to develop new *interpretations*. In my study, the analysis of students' discussions drew some interesting parallels. In the same way as the work of Lidar *et al.* (2005), in this study the role cards with questions appeared to guide the students towards examining and taking new knowledge, values and epistemologies on board. The way the card was written helped them to relate the information on the card to themselves, and this was made visible during the role-performances. As was shown in Chapter 5, when students acted out their roles, they were presenting themselves through the reasons, values and knowledge of their characters. Another characteristic of students' discussions was thus the exchange of points of view in a public forum, where contradictions and alternative perceptions could be made apparent.

Again, at times their interpretation succeeded, but there were occasions in which they made inconsistent use of the first person, showing difficulties with the presentation of the knowledge of the character. In addition, as demonstrated by the Shailesh group (excerpt 4-P, Chapter 4), failing to clarify each other's opinions led to a display of cynicism and ultimately, a certain disregard for the knowledge and perspective of the character (boy 2: "*and they have obviously got free prawns*").

In line with the work reported in the literature (e.g. Lifton, 1993; Plotkin, 2002), the analysis showed that the interpretation of a point of view involved decentering, and indeed the process of putting one's own point of view aside, to take on another perspective. This required an element of self-awareness, and consciousness about personal values and beliefs, ways of talking, expressing oneself and processing evidence. The search for consensus in the formulation of a shared role therefore brought this work only partially in line with the notion of meta-cognition described by Howe *et al.* (2000), in the realm of students' scientific investigations. The quality of consensus they achieved was linked to students' different abilities to value each other's contribution and take on another perspective. The evidence gathered in this study showed that the process of accommodating a different perspective was problematic, and slow. What appeared difficult was the need for students to use previous knowledge to make links and effectively build on other people's contributions, as well as researching and understanding their own beliefs. Even in the evaluations of the main study (Questionnaire 3, section 6.9), I could see that many students appeared to have learnt something about the topic, with a focus on facts, but there were fewer comments focussing on the more sophisticated aspects of persuading, listening to others and role-taking.

In Chapter 4, it was observed that students used parallel routes to role-playing: either via consensus-building, or via imagination, creativity and emotional tuning. The latter was observed in the course of students' discussions, and made its appearance in the questionnaires. It is interesting to compare the two routes, to observe the application of two different ways of thinking. In the course of students' discussions, students tried to speculate about a context which was not known to them, through cognitive thinking: they tried to use knowledge of their own context in order to re-construct the extra-European context, with some difficulties (i.e. the mentioning of landslides, in excerpt 5-B, in Chapter 5, was an example of misconception); they tried to work in groups to spell out meanings (i.e. the adjudicators, in excerpt 4-N, in Chapter 4), and in general, their ability to take on role was heavily reliant on students' ability to handle open discussion.

In contrast, the emotional route appeared to convey another sense of participation. For example, the girl in the Dharwar group (excerpt 4-L, in Chapter 4) allowed herself to enter, briefly but directly, a complex world, which was made of the single individual character and the wider context of human and environmental relationships. This added

another layer to the notion of participation in a role-play: as well as the ability to put forward a point of view, the activity also included the refinement of other perceptual capacities, such as the ability to tune in with the context of the character, even when the situation was yet unclear at the cognitive level. As a consequence, valuing the symbolic dimension of role-playing, with the creation of new meanings, does not mean involving students in pure exercises of fantasy and imagination, but working on their conceptual maps and representations of the world.

Concerning the question of how students could benefit from the role-playing activity, analysis of students' discussions helped in gaining understanding of the complexities of an activity of role-play, in which students contributed in different ways, from different levels of cognitive, social, and emotional ability. Talk in friendship groups suggests that during the role-play students could practice with argumentation and dissent in a safe manner, disagreeing without losing face or breaking the relationship. Hence they could practice important features of social life. However, Chapter 4 queried the quality of the relationships between the students. Were students really all in friendship groups? I had relied on the knowledge of the teacher to group the students, but it remained to be ascertained to what extent students were used to working in groups. Equally, other authors have made recommendations for increasing teachers' understanding of small group activities (Kutnick *et al.* 2005), and signalled the importance of increasing dialogues across teachers of different disciplines, for example to develop students' abilities to perform exploratory talk (Ratcliffe and Harris, 2006). Clearly, working in small groups gave more prominence to social and cognitive aspects in the acquisition of a point of view, while emotional and reflective capabilities were more visible at the level of single individuals interpreting their roles. We can perhaps speculate on the value of cooperative activities in supporting the development of students' emotional awareness.

Going back to the works of Mead (1955) – as reported in Chapter 2 – aspects of intersubjectivity and strategic interaction are built into the role-play. Through the process of role-taking, students are invited to consciously explore their actions, and become aware of the actions of others. In this regard, interpersonal relationships and individual reflective abilities are both important in the management of a complex issue. Social and reflective features can be recognised as core to the development of students'

competences and can be further analysed through the emotional reactions to the activity, as found below.

Q2. Do students feel angry after the adjudication?

Exploring students' emotional reactions to the adjudication was a means of ascertaining how students derived meaning from the simulated debate, and how they became aware of the complexity of the issue. The results from part B of questionnaire 1, in both the pilot and the main study (section 3.4.12 in Chapter 3, and section 5.4 in Chapter 5) showed that the adjudication divided students into two camps: the 'victorious', who were happy about the verdict, and the 'defeated', who expressed lamentations about the decision. Such results provided evidence of the normative dimension embedded in the process of decision-making, and how this was linked to moral and ethical aspects. The analysis of students' comments also showed that concepts of right and wrong, justice and fairness were challenged.

Across both the pilot and main study, different tones to students' comments were observed, relevant to both interpersonal and structural aspects. For example, students' feelings of anger and disappointment were coloured by students' own personal relationships with their peers. To quote one student: *"I feel that India will not economically develop if you have narrow minded adjudicators"* (Paul Power, pilot study, 3.4.12). Similar expressions of bitterness towards the adjudicators were found in the main study and were observed by the researchers at the end of the debate. One interpretation of these findings may be that students disliked having to accept a decision made by a group of peers, who had been somehow "elected" to the role of adjudicators. This interpretation is supported by previous observations related to a certain competitive spirit characterising students at this age, and particularly boys (Kitwood, 1974).

Another element is the nature of the simulation exercise described here. Previous work on simulation and learning, such as Cherryholmes (1966), presented a tight coupling between rules of the game and participants' relationships. In other words, the way in which participants interacted with one another shaped their memorisation of the social structures that were being simulated. The work of Kitwood (1972) usefully clarified that students hold strong values of fairness, but while they may be aware of the values of some roles, they may ignore others. By engaging people in a role-play that contains

structures of power as part of the simulation, we can expect some form of reaction. For example, they may have naïve views of knowledge as being equated with authority (Katz, 2001), and as indicated by Willmott (1997), students are not ‘neutral technicians’: their constructions of social realities involve “exercises of power, which produce and reproduce inequality” (Grey *et al.* 1996: 105). Hence the actions within the role-play have an important symbolic dimension. Anger and bitterness could indeed be taken as revealing of students’ sensitivity to power hierarchies. This may be confirmed by other experiences of role-play, where placing the teacher in the role of the judge did not generate such feelings amongst peers (Solomon, 2002, *personal communication*). Both in the role-play conducted in School 1 and in the main study, feelings of anger were found amongst the students, and interestingly for both studies, such feelings concerned boys playing the same role, that of Paul Power. Where the teacher sat in amongst the adjudicators, such as in School 2, in the pilot study, those feelings of antagonism were less manifested.

The evidence gathered for this study may therefore suggest that challenging students’ own perception of power and authority makes them angry, and this may infringe on learning. The setting of a public inquiry is by nature a competitive setting, in which people hold different power positions, and in which the task is not that of challenging authority. That being said, another way of playing the activity would be to bring students to realise by themselves the limitations of such settings, by getting them to reflect on the experience.

As was indicated by Jerome and Algarra (2005) “*achieving consensus is not always possible through deliberation*” (p. 502) and a compromise may not be realistic in the face of strong ecological constraints (O’Connor, 1999). The limitations of compromise were also discussed in Chapters 2 and 5, which drew attention to the need to go beyond the negotiations between individuals to tackle deeply-held images that people have about their roles, other people, and the environment. The results of students’ feelings after the adjudication may therefore be understood on the basis of how students felt in their roles.

When looking at the results of part A of questionnaire 1 in the main study, we can observe that students felt increasingly comfortable in their roles as they built consensus. Additionally, a certain dualism in students’ thinking could be observed: students

described being in role as taking sides, hence as being either in the right or in the wrong side of the story, as being either good or bad (i.e. Questionnaire 1, section 5.4).

Hence, being in groups and sharing the same role sometimes can accentuate students' sense of cohesiveness. On the other hand, it also increased a sense of separation and competitiveness. To understand how students gained understanding of the activity, it may be useful looking at other comments, of a more reflective nature. Comments from other students also suggested that the exchange of points of view was conducive to an appreciation of the values attached to disciplinary positions, which are represented in a complex issue, and these are associated with an emotional dimension. For example, other categories of students' feelings included a sense of concern, i.e. *"I remain concerned about the great health issues involved. I understand the decision was made for the long run but nothing was mentioned about the health risks"* (Dr. Krishna, pilot study). For some students, the dialogical exchange of points of view and the emotional aspects were a trigger for self-reflection, i.e. *"Unhappy that it was chosen to abolish them, but I understand better"* (main study, section 5.4). In this second case, students' comments did not simply express anger for not having won, or for not having satisfied one's own personal interests, but they appeared to convey more of an understanding of the value of other people's views and the need to deal with incoherent frameworks to find consensus.

By and large, exploring this research question requires depicting a complex picture of students' feelings. Students worked in groups and built consensus in order to take on role. However, some students acted at the level of "playing the game" whereas others seemed more concerned with understanding the issue, through exchange of ideas and sharing of perspectives. In line with Walton's definitions of debate (Walton, 1993), the Court of Inquiry was a means for disclosing information and clarifying views. It may be argued however that the adjudication and the debate reinforced competitive attitudes, which did not make students feel completely satisfied with the adjudication. To quote one student, *"the decision was good but more could have been said about the issues"* (pilot study). What is more, students felt they needed to take sides, and thought they could achieve absolutely right decisions. Also for the adjudicators there was a tendency to gather facts and information around the issue, but it was difficult for them to become aware of the values of other people and the assumptions underpinning their decisions.

On the basis of the interpretations conducted so far, we can tentatively say that during the debate students were given the opportunity to appreciate the rhetorical nature of controversial issues and to see the “other side of the story”. In this view, as the students’ comments indicated, it was difficult to be satisfied with one specific solution, which never seemed to be sufficient to encapsulate the reasons of all students. Additionally, the institutional setting of the Court of Inquiry, in which a small group of people interpreted the evidence according to implicit value-systems (as summarised in 5.5.), amplified the feeling of conflict. Figure 5-1 on p. 172 in Chapter 5, illustrated the flow of information in the course of the debate. In the figure, information was disclosed by the adjudicators and the witnesses in a process of questions and answers, and this gave rise to increasingly more sophisticated questions and to a growth of details about the sub-issues involved. However, while the interaction progressed in an orderly fashion, no possibility was there for checking perceptions and understanding and for re-considering previous points. Although each individual benefited from the discussion, participants’ own understanding of the situation remained by all means a private matter, which did not impact on the existing structures. A reality of actions and meanings was being described in the classroom through the exchange of verbal interventions, yet little could be said about the co-construction of a new and shared reality, which is built on mutual understanding and is the hallmark of inter-subjective processes.

The results obtained by the students indicated that within an argumentative setting there were opportunities for students to generally appreciate the multiplicity of points of view in complex issues. However, the findings suggest that the rules of the role-play can either reinforce or challenge students’ values and perceptions. Settings and roles are carriers of power structures and it is important to understand how these interact with students’ own experiences of power in the classroom. In this regard, it may be helpful to avoid the reinforcement of competitiveness. For example, students with reflective and social abilities can be selected for the role of adjudicators, rather than the “academically gifted” ones. Equally, avoiding excessively stereotyped roles can – as suggested by Jones (1980) – diminish the clash of powers, while enhancing perspective-taking and sharing of points of view during the simulation. This second arrangement is in line with other sources of practitioners’ literature – discussed in Chapter 2 – which located the teacher outside the simulated action, with a role of facilitator and information-manager. In this role, the teacher is given the opportunity to observe the social dynamics occurring during the role-play, learn about the students, and subsequently help students

to reflect on their feelings during the adjudication. In some way, this other possibility is in line with other pedagogical approaches, which have espoused the idea of problematising classroom situations, recognising that all issues and matters are contestable (Giroux, 1997), including the position of the teacher. This would have the purpose of gradually leading students towards further developments in the role-play, in which they could practice with inter-subjectivity and be given the role of active agents in their knowledge.

This second way of working is closer to a model of learning such as the communities of learning, rather than juries or Court of Inquiries. These are different because the discussion is not only aimed at finding a solution for a crime but is driven by the desire to engage with the creation of new scenarios. The process is not aimed at the exclusion of the other, but involves the more sophisticated competence of reflecting and accommodating the range of available opinions. The next question will deal with the data gathered in Chapter 6, on students' engagement in the search for consensus through dialogue.

Q3. How far do students use empathy to engage in the search for consensus, and deal with conflict?

In the process of dealing with conflict, students were confronted with challenges at all levels. The outcome of the verdict shaped the discussions into a multiplicity of competing agendas, each one was supported by their own set of information sources and personal opinions: how to match environmental quality with growth of economic production? How do we tackle poverty and malnutrition, in consideration of wider problems at a global scale, such as salty soils, violence, and global environmental changes? As was shown by the analysis of students' discussions in Chapter 6, the task of dealing with conflict was difficult, and produced mixed results.

The patterns of talk observed in Chapter 6 for group C gave evidence of the difficulties encountered by the students. For example in group C, and to some extent also in group A, there was a higher degree of irritation, with the boys engaged in argumentative exchanges. In the initial part of the activity, students who felt angry after the adjudication continued to express bitterness. When the performance of group C is compared to groups A and B, we can see that an improvement of the discussion was

linked to an ability to consider suggestions coming from others, although there were differences in the types of dialogue that were enacted.

In group A, a change of tone occurred from the initial argumentative question: *Ok Dr. Krishna, what do you believe?* (Group A, section 6.4.2), to a think-tank talk about viable solutions. Students in Group A also achieved a shared solution, recognising fair trade as a viable activity, which combined fairness with sustainability (e.g. they thought of teaching the villagers about more sustainable ways of farming prawns). Still, their thinking was very much focussed on the local environment. In contrast, in group B, the resolution was concerned with a process of understanding the underlying causes of the conflict, and the students touched upon the international dimensions: i.e. *"the other countries want to buy delicacies like prawns"* (Group B, section 6.7.3). Similarly, for group B in Chapter 6, students started on the path towards resolution from a question, which had rhetorical features: *"so what are we going to do?"* (Group B, section 6.6.3), which emphasised the actions they could take together. In this second case, the data seemed to suggest that the outcome reached by this group was linked to reflection, pondering of situations and consideration of personal responsibilities, rather than with any specific solution. The discussion conducted by this group was still quite short, yet sufficient for a general understanding of the objects of their reflection. As was shown in Chapter 6, the discussions between the characters in group B appeared to include elements of imagination of different contexts, such as smaller farms, alternative farming products, and improvement of the relationships between the villagers and the local landowners. They advocated quality of life, and made links to other issues associated with human impact on the environment (e.g. deforestation). In the final presentation, Group B was conscious of not having being able to find a real solution for the problem; arguably perhaps, they might not have realised that they had instead engaged in an important process of exploration and understanding of a complex situation.

The evidence of successful dialogue brings the discussion back to the distinction between rhetoric and argumentation. In other words, what counted was in the definition of Billig (1987), the ability to *show* a way of doing and thinking, and engage in the exploration of each other's perspective. While in the first type of discussions in friendship pairs - analysed in Chapter 4 - argumentation had a positive element (i.e. it was a means for supporting information-seeking processes), it failed as a mode of communication in the second type of discussion. The rigour of logic and the defence of

one's own point of view were counter-productive, increasing students' frustration. During small group discussions, students were required to build consensus; whereas in Chapter 6, during the resolution of the conflict, they were required to actually listen to the other person, and to constantly examine their own point of view in relation to the other's.

By and large, students in group C found it hard to change their style of talking in any way, in order to deal with the conflict. Students in group A exchanged some ideas, while students in group B appeared to have generally managed a process of exploration. As indicated in section 6.5, some questions elicited students' personal experiences and feelings, and these appeared to convey a genuine concern for the other person's point of view. Discussion in conflict was not simply directed towards consensus, but towards understanding, with some features of ethical understanding and creativity. These findings contribute to further define the concept of emotional involvement in role-playing, which includes motivation as well as a sense of purpose, personal reflection and imagination. The silence which was observed between the speakers in group B in section 6.6.3 could also be associated with a form of emotional tuning and empathy, defined by Heron (1992) as holding a creative dimension, for new ideas and progression were observed after the occurrence of pauses in students' discussions.

To sum up, such findings point to many directions for implementation. Dialogue certainly appeared as a difficult thing to do, and in this process, social aspects appeared to be related to psychological features of the students. In the first instance, students were no longer operating in friendship groups. What is more, the adjudicators – who had generated feelings of competitiveness from the students, had now joined the groups. Mindful of the aim of conducting conflict resolution – and of stimulating students' abilities to reflect on personal values and assumptions – the quality of personal relationships was a crucial component. To this end, the findings obtained from groups A and B could be used to speculate about the facilitating conditions for this task. For example, two factors in the success of dialogue in Group B may be the girl's ability to tune in with the character, and an adjudicator who did not try to challenge the characters' propositions, or was not perceived as challenging. A similar observation can also be made for Group A, in which one of the girls asked a question on one occasion which appeared to touch upon a sticking point for the group, and then, after discussion had started, she withdrew from that role. This can have implications for any future

refinement of the method. A subsequent cycle of role-playing could include, for example, a period of collective reflection on students' feelings in the simulation, and an introduction that explains the nature of conflict. Students' inclination towards competitive argumentation can be balanced, for example, by moments of reflection, in which students are guided towards an exploration of their emotions, and they can practice with empathy. In the course of the role-play, students could work in small groups and decide out of their own initiative to practice with the swapping of roles. This would also imply a change of role for the adjudicator. Rather than performing a role of judge or negotiator, a new role can be defined for people who may want to support the players in talking about their perceptions of the issue, and *facilitate* - as was suggested by Bohm (1997) - the search for appropriate strategies. This would require preparation and a more explicit teaching of conflict resolution approaches, as well as repeated trials of role-play, to research the process of students' development of confidence in handling situations of conflict and how this can impact on their conceptual and personal development.

To sum up, from the first activities in the pilot study to the results obtained in the main study, the data appear to illustrate the difference between approaching conflict resolution as a problem-solving activity and as a process of continuous exploration of both relationships and context. Attention was focussed on imagining future scenarios and getting students to experiment with cooperative ways of working, from a declared ethical standpoint. The next section looks in more detail at the scientific aspects, and how these were developed by the students during the task.

Q4. Do students use scientific knowledge to understand the issue?

In line with what was said earlier, scientific knowledge, as well as other kinds of content knowledge, was generally used by the students during the discussions. For example, students referred to a number of scientific topics, such as salt in the soil, protein intake in vegetarian and carnivore diets, biodiversity and sustainability. An interesting observation concerned the use of scientific information in conditions of controversy. The belief that prawn farming can increase food availability was contrasted with the impacts of prawn farming on wild fish stocks. To quote one student: *"Yes but it is not very... it is a bit high intensity in itself, you know how much protein you would have to use, you have to use twice as much protein as the weights of their bodies, the*

farmers" (Group D, boy 1, section 6.5.1). In such conditions, students were confronted with scientific information derived from different disciplinary frameworks which they needed to discuss. In consideration of what was said earlier about consensus, it is not surprising perhaps to see that in spite of the sophisticated information that the student quoted above shared, the group lacked the ability to take the discussion forward. In that specific case, students failed to think of other ways to gain protein in more economical ways, for example from vegetarian sources. Similarly, in the discussions that took place between the groups in Chapter 6, it emerged that techno-scientific solutions were often mentioned, but these did not seem to be instrumental in building consensus. In line with the studies discussed in Chapter 2 by Howe *et al.* (1999), the transparency of the issue is important, and these findings seem to point towards a situation in which students needed support in understanding ecological interconnections spanning across the ecosystems, on all scales. Additionally, the development and content of the discussion was related to the quality of group work.

In this regard, it was interesting to observe the Margherita group as an example of scientific information which was elaborated and put into context by the group. During the debate, students managed to make an effective explanation of the inter-connections between the felling of the mangroves, the resulting lack of fish in the sea and the poverty of human populations, and began to describe the networks and feed-backs which characterise living systems: *"Basically it is a lot of problems for animals like even birds because the mangroves trees are being cut down and they provided a really good environment for those"* (Excerpt 5-D, Chapter 5). This was the product of a combined verbal effort, which led to the description of the complexity of the interactions between prawn farming and the ecosystems. During the debate the boy tried to integrate the two concepts of food-chains and food-webs: Margherita (boy): *"And also wild prawns (...) they are dying out because the mangrove trees are being cut down, which means that there will be a missing link in the food chain"* (Excerpt 5-D, Chapter 5).

Hence, collaborative talk was instrumental to understand the interconnected nature of biological phenomena. Still, there were difficulties in visualising links and interconnections between different aspects of the issue, and events happening at different scales, and times. None of the groups, for example, managed to connect the use of freshwater for irrigation and prawn farming with the salinisation of the soil. This

would have required an understanding of the balance of salt and fresh water underground, and familiarity with the environment as a dynamic, interconnected system. As indicated by Bahar *et al.* (1999) and Williams and Tolmie (2000) – discussed in Chapter 2 – a major difficulty in learning biology is that it encompasses three dimensions of thought, namely macro, micro and symbolic, while traditional biology teaching is still learnt as a collection of isolated facts (Chen Young Lin and Reping Hu, 2003). In the case of this research, the quality of biology learning appeared to affect students' ability to deal with the issue, and during role-playing students were stimulated to engage at all dimensions (of both knowledge and symbols).

This reflection may also suggest that greater interaction with an adult expert, as was argued by Howe *et al.* (1999), in Chapter 2, could enhance students' meta-cognition, and contribute to a more conscious approach to the study of biology. For example, more research could be put into understanding the connections between a more explicit teaching of the global cycles of matter and flows of energy in the biosphere, and students' understanding of human systems as part of the larger ecological system. Also the study of the human body, as a complex, open system, which is permeated by flows of energy and matter, could help re-connect biology within a study of sustainability (Camino, 2006, *personal communication*; Gagliasso, 2001). It is also the open and articulated acknowledgment of the values embedded in our thinking and practices, ranging for example, from an anthropocentric to a geocentric point of view, which may help students to develop conceptual schemes for the interpretation of environmental issues. For example, in group B in Chapter 6, students worked on building complex scenarios, by trying to understand the different points of view, and this led to some surprising results. As was discussed in Question 3, students began to approach the notion of interdependency between human actions and the environment, starting from the explicit value framework of power equality. Some of this understanding is further dealt with through the following question, which draws on students' perceptions of their learning during the activity.

Q5. How much do students remember about the experience three weeks after the activity is conducted?

The results of questionnaires 2 and 3 in both the pilot and the main study (sections 3.4.12, 3.4.14 and 6.9) can now be understood further in the light of current discussion.

In both studies, students indicated that they had learnt about the specific aspects of the issue and the processes involved. Learning was indeed connected to participation and communication with others. Interestingly, the opportunity to engage with a plurality of views also triggered a general sense of awareness of the complexity of situations, that there is more than one possible interpretation and that also other positions should be considered as important and legitimate. For example, comments from the main study (section 6.9) included:

“Listen to an argument especially those I would automatically have assumed weren’t the right opinion/argument,”

“About all the problems and that it is hard to know what is right and healthy to do for everyone.”

This has also implications for the personal development of the students. When confronted with the variety of positions, information sources, values and disciplinary understandings of natural systems, students reflected on the process of formulating a personal opinion. For example:

“There are a lot of views about issues and it’s hard to get your view across.”

“There are important things going on in the world that I don’t know about.”

“I learnt more about things going on in India and how to have an opinion on them.”

Overall, the findings from the study cast light on the educational features of a role-play. In the course of their participation, students could practice with competences of self-expression, and they learnt something about the world, themselves and others, in the engagement with peers. Albeit tentatively, we can say that in friendship groups students can practice a number of skills, from argumentation to the selection of information. From the study of the cooperative resolution of conflict, a relationship was also tentatively found between the ability to perform dialogue in conflict and students’ perceptions of the local and global dimensions of the issue, which included an element of reflexivity (i.e. through the reflection on the links with the Western world). This may suggest that there is room for implementing role-play activities in current classrooms where the reflective aspects of the activity can be further developed.

By and large, the results obtained contribute to describing role-play as a holistic methodology, in which the social, cognitive and emotional aspects of students' learning are interconnected. For the pragmatic reasons explained in Chapter 3, this study was limited in the extent to which it allowed communication between teachers and collaboration between teachers and researchers, with time being a central issue. In the second part of the discussion I will endeavour to reflect on the place of role-playing in current school curricula and the implications of learning not only *through* role-playing but also *as* role playing – that is in a way which enhances plurality of perspective and discourses, and builds on students' personal knowledge and epistemologies. The findings from the research will be used to support a vision for education, which encompasses the dimension of students' competences and considers pedagogical and epistemological aspects of classroom learning.

7.3 Reconnecting role-play to school science education

Here I would like to revisit my findings to explicitly re-connect them to my original aims and objectives. While my specific focus was on the conditions for performing dialogue in conflict, this research was initiated by a particular philosophy, progressively conceptualised in theory and practice starting from Galtung's non-violent framework (Galtung, 1996, discussed in Chapter 2). The second part of the discussion is therefore concerned with understanding the value of this perspective that was built into the role-play, how it affected the students and how it can be used to inform a vision of educational change.

This thesis opened with a personal quest for an education that can prepare students to actively use their knowledge and their learning to understand complex issues of personal and societal relevance. I had embarked on this reflection starting from a personal experience of disempowerment towards environmental problems, followed by the beginning of an understanding of the contradictions of socio-economic developments, and the ambiguous role played by science and technology in shaping the natural systems. In this context, the role-play on prawn farming appeared as an opportunity to consider issues of economic development and learning as part of a school activity. To what extent this activity had impacted on students, and succeeded in bringing something new to school education now needs to be more finely discussed. The specific objectives of the role-play activity were to:

- introduce students to the complex nature of socio-environmental issues;
- offer students the opportunity to participate in discussion;
- explore the dimension of “conflict,” and learn about power by means of a non-violent approach.

As reported in the first part of the discussion, the findings of this study gave rise to a complex picture. During the role-play, students’ previous knowledge and abilities shaped and were affected by the role-playing processes, and the activity as a whole was in dynamic relationship with the external context (the classroom, the school and the background experiences of the students). The study could be seen as a moment in time in which learning and change had occurred. Listening to students’ discussions in the course of the activity often filled me with enthusiasm and a sense of hope. During the role-play, I was impressed with the ease with which students’ tapped into broader discourses and ideologies, when they were taking on role. They often used expressions that are commonly reported by ‘real people’ involved in such issues. They equally displayed the reassuring and optimistic tones that characteristically coloured the discourses of the economists and the prospects of environmental disaster pronounced by some politicians and activists. In this respect, I was impressed by students’ familiarity with such discourses and the way in which they entered the classroom context. Equally however, I was unnerved by what I had perceived as being messages of fairly deterministic images of the future held by the students. They had memorised the myth of indefinite progress and improvement, as well as societal fears of inevitable destruction. However positive or negative, I was sensitive to the fact that such images seemed to be lying outside the locus of action of the students. By contrast, I was interested in observing situations in which they managed – with small but telling achievements – to learn about other and less familiar discourses. Of particular interest was how they managed to step outside the ‘taken for granted’, to explore the *desired*.

In this process of discussion, perspective-taking and dialogue, students encountered the complexity of socio-ecological issues. Students’ practical experiences and knowledge were confronted with new interpretations, with some opportunities for conceptualising complex situations. For example, they explored the emergence of patterns as characteristic features of complexity (Resnick and Wilensky, 1998; Imhoff *et al.*, 2004), but this could also be extraordinarily contrasted to other episodes of talk out of role, which did not contain the same level of understanding and thinking about nature,

science or even other cultures. Some examples of talk out of role are given in what follows to introduce a discussion on students' personal epistemologies and the context of the role-play, and to link more effectively pedagogy, epistemology and competence as the three aspects of educational change (Katz, 2001).

7.3.1 Students' talking about the context of the role-play

Because of the way in which the study was conducted, the role-play had to fit in and interact with an existing structure of classroom relationships and norms. It was outside the focus of this study to make specific observations about the schools or the teachers, although students' personal beliefs and experiences dramatically shaped the course of the activity and became amenable to my observation. As was indicated in the previous section, in the course of role-playing students' knowledge of biology had been challenged by the complexity of the issue. An example from a conversation between students in the Dharwar group (main study) illustrates how such challenges involved students' images of biology, and how this was linked to organisational aspects of the school:

Dharwar, 5th minute of recording (off-task event)

107.Boy3: it is about prawn farming, today biology. Is this about the land?

108.Boy2: Yes but it is like biology because it is about prawns and they are alive.

109.girl: giggles

110.Boy1: it's eco-systems.

111. Boy2: Is that, I thought that was ehm, I thought ecosystems were for geography.

This excerpt is striking for the contrast between the local and global dimensions included in the prawn farming issue and students' fragmented image of the biological world. This can be understood as a form of reductionism in thinking about Nature, which appeared to be reinforced by the divisions in disciplinary compartments and timetables. Another element of information about the contextual conditions of the research is offered again by the Dharwar group, during an off-task period of talk in the first lesson, when students had realised that another science event, organised by the researchers in residence, was going to clash with the prawn farming lesson:

6th minute of recording (off-task event):

- 17. Boy3: For two quid I don't understand it, what do you do?
- 18. Boy2: You look at bubbles, blow bubbles or something.
- 19. Boy 2: Do you actually just blow bubbles because that would be that is quite fun? That's meant to be like scientific anyway.
- 20. girl: yeah

This kind of informal evidence gathered in the course of my short presence in the school can be used to support some tentative suggestions about the criticalities of role-playing, as a technique which involves students' ability to make sense of their own experiences of learning, offering new pedagogical settings and epistemological underpinnings. Considering that the data presented in this section were obtained from the group that had the greatest difficulties with role-playing, we can now try to expand on the emerging framework which links students' competences with a reflection on science and civic participation.

7.3.2 Role-playing in the context of a reformulation of the idea of Nature

In the discussion conducted so far, role-play came out as an activity that draws on students' images and meanings, and values the learners' engagement in all dimensions. It was proposed that this learning technique elicited students' development of skills and competences. However, the symbolic dimension of the activity somehow encompassed normal discussion activities to address students' images of Nature, the role of science and technology and ultimately, the issue of personal human responsibilities towards other people and the natural world.

In previous sections, this kind of second level learning was described as a redefinition of the existing conceptual maps, by means of accommodating new perspectives, and redefining roles and relationships. As was shown in Chapter 6, during the activity on conflict resolution, the students playing Tami and Shailesh (group B) engaged in dialogue and, as they started doing so, they began to display a more tentative type of reasoning. Knowledge of events was not just simply taken from granted, but they were considered in the light of other possibilities, i.e. Girl: *"yes! And people might even fund it!"* (Section 6.6.3, Chapter 6). Through the process of listening to other voices, students' conceptions were sometimes challenged and enriched by other elements. At several points during the activity, students mentioned the idea of plurality (as indicated in the final questionnaires and discussed in the findings), and complexity. The tentative and considered tones of students' comments and conversations hint at a reality that is

uncertain and unknown. In addition, while in the pilot study students appeared to have grasped the notion of multiple views, and emphasised the difficulty of coming to an agreement, in the main study it seemed that the increased levels of participation amongst some students was favourable to the development of precautionary mindsets towards risk and uncertainty (section 6.8).

The results reported at the end of Chapter 6 about conflict resolution began to show that while being exposed to a multiplicity of views can be discouraging and daunting, a form of critical dialogue amongst perspectives could be a means for growth and change. Of course, the evidence provided here is far from conclusive. Results showing students' development of ethical understanding can be contrasted with the fairly simple ideas of science-fiction, or of science and technology which are powerful and competitive. Still, within dialogue, there was space for students to both explore risk and opportunities for new actions.

In some ways, the voices of the students who managed to perform dialogue began to sketch a view of Nature that was more complex than the simple collection of resources. Their understanding of risk and complexity appeared to resonate much more with current developments occurring in the sciences themselves. As argued by Gallopin (2001, 2004) a conceptual transformation is occurring in the sciences, with a shift from a mechanical view of the world to a complex and organic view of society and nature. While the first view focuses on components and parts, the second one considers the parts as intimately interconnected, organised in hierarchical levels, with multiple feedbacks between them:

"[...] systems at different scale levels have different sorts of interactions, and also different characteristic rates of change. Therefore it is impossible to have a unique, correct, all-encompassing perspective on a system at even one system's level. Knowledge of the system is always incomplete. Surprise is inevitable. There will rarely be unanimity of agreement among peers - only an increasingly credible line of tested argument (Gallopin, 2004 p.9).

In this regard, the learning process that has been outlined so far fits in with a process of construction of knowledge of the world as a complex and interconnected system, which is little amenable to prediction and control. This kind of learning became possible when

students managed to recognise assumptions underpinning methods, and distinguish between various sources of knowledge, and between personal experiences and opinions, in a way that only started to occur during dialogue. By taking this perspective, we can see that students' learning focussed both on the ecology of the natural systems and on political matters. In advocating issues of human rights and the damage created by the farms to human health, they had an opportunity to tap into a concept of Nature as a complex and interconnected system of services. Inherent in a complex view of Nature is the understanding that matter is circulated through the biosphere and forms emerge in Nature in complex equilibriums and evolutionary cycles.

The fragmentary views of the ecosystems that were also found in students' excerpts, along with other, more ambiguous positions held by students on matters of risk (Table 5-A in section 5.5) could be discussed in the light of findings from parallel research conducted on scientific textbooks. Extreme simplification of the complexity of the investigations of the physical world (Bryce and MacMillan, 2006) resonates with simplified representations of complex bio-geo-chemical cycles (Perazzone, Colucci and Tonon, 2006, *personal communication*), which convey an impression of the biological systems as fragmented and disconnected, and include erroneous representations of local and global bio-geo chemical transformations. The authors of the research talk about 'sanitized' views of science, and 'simplified' views of the natural world, whereby science equates to technology, and the problems of the science are number-crunching 'fixes'. That this kind of representations of science and nature can facilitate students' learning is dubious, as students are not made aware of the conceptual difficulties involved in understanding complexity. Equally, false images of prediction and control are in contrast with the debates and difficulties surrounding controversial issues, resulting in disenchanted images of science and power. This riddle was interestingly enacted in the course of students' conversations during the role-play, and appeared to constitute part of the difficulty of the task: Group A, Dr. Krishna: "*Well you are kind of contradicting yourself there aren't you Mr. Mr...bureaucrats.*" (Section 6.5.2, Chapter 6).

While science educators lament students' general confusion and disaffection towards science, other realms of science studies suggest a complex, yet sometimes disempowered, attitude amongst 'the public' towards global issues, coexistent with optimistic, albeit unrealistic, images of unquestionable power of science and technology

(Layton *et al.*, 1993; Turney, 1998; Bucchi, 2006). Hence the general socio-cultural context surrounding science education nowadays is calling for educational activities that can bring power back to the ‘knower’, building on students’ own experiences and knowledge, and starting from where they are at, to move towards progressive empowerment. The process of learning so far described could be seen as a progressive dismantling of the deficit model of the student through the opportunity of engaging in meaning-making, and overcome the somewhat disappointing and insufficient images of Nature. To this regard, the role-play activity proved a moment in time, in which students were confronted by the power of knowledge and human activities in the world and were put in a position of responding to it by drawing on their knowledge and meanings. In this regard, role-play – through the variety of dialogical settings that can be enacted – could be offered as a methodology for allowing such an expression of knowledge and experiences that is required for public engagement, starting from the context of the school.

7.3.3 Empowerment of the public

The observations presented in Chapters 4, 5 and 6 can be revisited in the light of Halliday’s concept of the three functions of language, discussed in Chapter 2. These were: the interpersonal function, through which we communicate and exchange information and thoughts; the textual function, through which we can organise an argument and create an integrated text, and the imaginary function, through which we can perceive, organise and represent reality (Halliday, 1975). As the data has shown, the three functions are interrelated and interconnected, and the task for the students was being able to use them appropriately.

As was also observed in the course of the preliminary visit to the schools, in both the pilot and the main study, the emphasis was on giving students notions and definitions. As documented by a large number of empirical studies (Desautel & Larochelle¹⁹, 1989, 1992, 1993), the prevailing use of this function in school science textbooks contributed to a false image of science, which is that of a descriptive and neutral observation of reality. Labelling and coding are the language means for organising knowledge of the

¹⁹ This publication emphasises that scientific knowledge is presented as the knowledge of something rather than knowledge which is socially constructed and negotiated. Additionally, beside this objectifying view of science, there is an emphasis on teaching strategies which tend to favour the repetition of

world into concepts. While this function of language is used to transmit knowledge to others, it also impacts the way in which we think about the social and natural world. In the work of Halliday (1975), the various languages that are available to human communities can be seen as resources for the creation of new meanings. In other words they are a means for negotiating, re-constructing and changing the nature of social experience. This in turn leads to the construction of knowledge and involves the development of competences - as was observed in the final questionnaires - during the role-play.

As we know from the study of a foreign language, and as the students have managed to experience during the discussions, meaning did not reside in the specific words of a language, but in the minds of the people, and in the webs of connections that were established in the brain as a response to verbal stimuli. In this also resides the reflexive dimension linked to language: to learn another language is not only a technical skill, but it allows us to move closer to other social and cultural worlds, and to see our world from another perspective.

In this particular case, the idea of constructing a role-play, which included the voices of people who are normally excluded from official public decision-making forums in the West, is in line with some forms of participatory processes, in which each stakeholder brings an equally legitimate perspective on a complex problem. Several authors in the scientific community have argued this position (Funtowicz and Ravetz, 1999; Davies, 2003; Jasanoff, 2005, and Kasemir *et al.* (2003). The contributions of all such authors form a constellation of voices which describe a different model of science: a science which is embedded with both facts and values and an epistemology which recognises the legitimacy and partiality of different voices and points of view.

From the discussion conducted so far there is scope for arguing then those activities which develop students' awareness of the complexity of the Natural systems could be a form of empowerment, as opposed to disempowerment, passivity and a lack of understanding that some have lamented within the students (Lang, Drake and Olson, 2006). The notion of the student population as 'public' evoked here is necessarily a broad one. While current literature in the public understanding of science has focussed on the knowledge and abilities of the citizens to participate in decision-making

processes (e.g. Irwin, 1995; Joss, 1999; Collins and Evans, 2002), it often refers only to a specific group of citizens, and not always to the students. Leach, Scoones and Wynne's (2005) more recent critique of STS approaches was concerned with the exclusion of the global dimension, and the need to engage people's personal behaviours. This discussion can thus be enriched with the perspective of Latour (2003), stressing the notion of global action and personal responsibility. According to Latour, the scale of transformations operated through science and technology in the global world are such that their development can be compared to large-scale collective experiments, which involve wider communities, and in some cases, the population of the world as a whole. In this scenario, the notion of a disinterested and objective science is no longer tenable and the public is confronted with the challenge of making choices, and sourcing alternative models and images of development that are local and global. Furthermore, with the current emphasis on processes of public dialogue, engagement and involvement in decision-making (e.g. see Miller, 2001 and Wilsdon and Willis, 2004), the type of experience nurtured in school students via role play is likely to help enhance the capacity and motivation of tomorrow's citizenry to play a more meaningful part in decision-making on socio-environmental issues of the day.

In the role-play, dialogical settings are created to simulate public democratic structures which can be offered to students for practicing the skills of rhetoric, argument and decision-making (as was suggested by Solomon 1991; Camino and Calcagno, 1995; Simmoneaux, 2001). However, as I have argued here, this methodology can also be used to create a different way of being in the classroom. The potential for meaning-making and for the creation of a more engaged and participatory way of learning and being with others can be expanded beyond the two-hour lesson to permeate the whole curriculum, implicit and explicit, particularly if the role-play is used in conjunction with other approaches and activities.

In the interesting historical account given by Miller (2001) on the relationships between scientific knowledge and the public, it emerged that much of the representations of the public held by societal bodies are embedded in the specific fabric of the culture in a particular time, and these have often been concerned with images of deficit and disempowerment of the public. If a move towards collective engagement is to be made, this requires the development of competences, and an extension of the idea of the public

to include different age-groups and different social contexts. Schools can thus be proposed as environments for knowledge construction, pupils as active citizens of the present and learning as a relevant process which enables the taking of action in society.

In the role-play, ideas of Nature, ideas of science, and local and subjective interpretations of the students came into play. Students' learning took place out of the interaction between multiple uses and types of knowledge. For example, in the course of cooperative discussions, students explored the complexity of the issue through the lenses of different disciplines, each one contributing in different ways to the creation of meaning and understanding of the socio-ecological world. Students were confronted with different assumptions and cosmologies found in different cultures about the relationship between human communities and the land. For example, the interpretation of the word 'autonomous', as reported in Chapter 4 in the context of the adjudicators' discussions, constituted a critical instance. They were able to understand the need for people to own a piece of land to gain valuable resources, but they were less attuned with another position, which considers the land as a terrain of memory and identity (Ingold, 2000).

In relation to role-play and its use in science education, the findings presented in this research gave an image of a classroom context in which students can practice dialogue, and this is a rich process of knowledge sharing, conceptual understanding and meaning-making. When discussing socio-environmental issues, students might not have the specialised, technical knowledge of the scientists, but they can practice openness towards listening to explanations based on experience, such as, for example, the experience of people who have lived in the same place for a long time. As indicated by authors in different realms of the sciences, these kinds of knowledge hold evolutionary value and they also have legitimacy. For example, Ingold (2000) referred to the concept of multi-rationalities, and dialogue as a requirement for quality assurance of the knowledge they bring (Sen, 2006). From this perspective, dialogue is a vehicle for change, which can impact on students' own epistemologies, and the messages sent out by school curricula. In the specific case of scientific knowledge, official and accredited sources are explored critically and the scientific knowledge itself can become one in amongst many other ways of knowing.

Of course, alongside episodes of successful interaction between students in role, the data also gave examples of when this did not occur. When students did not take on role they failed somehow to accommodate their perceptions of valid knowledge with what they were supposed to recognise as valid. For example, in the case of the adjudicator in group C, Amanda (in Chapter 6, section 6.6.1) rejected the views of the Gandhian activist Jeganathan, and thought of the expert academics/scientists as being in a better position for solving the controversy. Hence the negotiation of the different types of knowledge can be inhibited if science is thought of as something that could unequivocally describe reality and that is the exclusive domain of experts.

In this respect, role-play was challenging commonly-held assumptions by means of introducing new structures for knowledge construction. In addition, this study attempted to uncover conflict and make the power structures that exist in society visible. For such reasons, this research is placed in a different position from those who have given a special place to the consensus of science as a means of solving controversies (Duschl and Osborne, 2002). Students were confronted with the challenge of understanding processes that were not linearly related, and were described by different disciplines. Equally, they were confronted with the values underpinning knowledge and the issues of both controversy and inequalities. While students could use role-play for the refinement of discussion techniques, which included argumentation and the processes of science knowledge construction, they could equally explore other channels for approaching knowledge, and critically reflect on the strengths and limitations of their chosen approaches.

Valuing students' knowledge and experiences is a means for supporting the construction of a personal standpoint. This means having a value and political stance on society and science, to include their life-projects, and the subject and processes of their own learning. What counted during the role-play were the students' voices and ideas, and the decisions they took were the results of their actions. There were no "right" or "wrong," manipulating or steering, but simply action, which was reflected upon and eventually revised, in light of further experience. In this sense, this work was more in line with the kind of "humanistic science" advocated by Aikenhead (2006), and thus a science education which is preoccupied not only with presenting the products of science, but also the processes through which scientific knowledge is constructed, a science which can value creativity, in both the processes of inquiry and the content.

In relation to current trends in science education research reported in Chapter 2, such findings are in line with research that recognises students' abilities to reason upon a problem (Jimenez-Aleixandre, 2002; Ødegaard, 2003) and make decisions that take into account their own values. However, it was also emphasised that a different type of science learning may be required for them to be fully engaged in the discussions. This brings into discussion an ongoing debate around teaching in Science, Technology and Society, especially those who protect the learning of scientific concepts and those who promote students' engagement with values. In this context I would argue that the results obtained from this study suggest a much more complex situation, which brings into question the implicit curriculum, assessment practices and the messages which are given to students in relation to knowledge (and science), all of which have an impact on students' ability to understand complex and controversial issues. From this perspective, coherent linkages between curricular activities and classroom practices become important to sustain educational change. The symbolic dimension embedded in the role-play encourages us to take a different approach to viewing the classroom. This is not so much as a collection of individuals, but as a place for the creation of explicit and implicit messages: what is allowed and what is not allowed, what is considered to be good and acceptable and what is not. School time plays a part in the process of construction of students' own identities and self-images, and assessment is the powerful instrument that can either enhance or undermine learning.

7.3.4 Assessment and learning through role-play

By definition, role-play is a tool for participation and reflection. For science education, this means that discussion around students' involvement in science and the emphasis on skills, such as argument or problem-solving has to be extended to consider the assumptions underlying these skills and their critical potential. This raises questions for curriculum and assessment. As indicated by Sterling (2002, 2003), a shift can occur from curricula that are structured around specific goals, towards an understanding of curriculum as a means to provide meaningful learning experiences for students. In the previous section, I suggested that the observation of a role-play enactment equated to observing the engagement of students' personal epistemologies, hence how they grappled with what they know, and how they reached new understanding.

A key issue that emerged during the study was how to interpret the material that was gathered, and which aspects were noteworthy of consideration. In many ways this can be an aspect of interest for teachers who want to use role-play. How do we observe students' learning? And what do we look for?

The argument developed so far insisted on valuing students' engagement with the construction of new meanings: evidence of conceptual thinking was provided through students' use of metaphors (e.g., excerpt 4-G in Chapter 4), as well as active retrieval of knowledge of similar processes occurring in other contexts.

Aware that teachers may still find discussion of socio-environmental issues 'difficult' (Bryce and Gray, 2004; Levinson and Turner, 2001), and role-play in particular, I hope that my personal experience with this work can provide some practical and theoretical suggestions. For example, my ability to access and to describe the particular situation of meaning-making created by the students in the course of the simulation was itself a gradual process of learning. As I have shown in Chapter 4, my interaction with the students was not always successful in supporting students' discussions. Similarly, the teacher in the pilot study found it difficult to interact with the students in the process of role-playing. It also became apparent that orienting students towards new information was sometimes not productive; students seemed more receptive to interactions that were supportive of their own current reasoning. This confirmed that putting together a role-play is indeed a difficult act, which required knowledge of the class, as well as being comfortable with an image of students' learning as the unfolding of personal paths. This also means that students' images of science may not be necessarily aligned with the ideas of the teacher (or the researcher).

During the analysis of the data, I gradually changed my approach, which followed from a progressive knowledge of other research approaches. Because of my background in science, I was familiar with an approach that divides into parts, examines the detail, and looks for similarities and differences. By deepening my study of other research approaches I had the opportunity to learn to value other variables of talk, such as the pauses and silences. The students' sentences, which appeared disarticulated and de-contextualised in the initial reductionist approach, could offer new and interesting cues when they were examined in their whole, and linked to the context.

In this sense, this work showed that it might be appropriate for the teacher to have a means of recording students' voices and experiences. In the course of my study, activities of evaluation carried out at the end of the activity were important in tracking students' skills development and capabilities during the role-play. In the light of the understanding gained from the analysis, additional activities could then be devised and researched. For example, concept maps can be used to assess students' understanding of biological webs or even their perceptions of themselves as part of the larger ecosystem. Studies on students' ecological identities for example, can be linked to role-play. This type of intervention requires a clarification of the concept of assessment, which is not only assessment of the students, but it is also an assessment of the activity, the opportunities for learning and an assessment of the learning process.

Embedded in this line of reasoning is a clarification of the learning contract between students and teachers, and a redefinition of the meaning of assessment. In this case, experience of the role-play can be used to plan activities that can fulfil some specific needs, overcome weaknesses and respond to the curiosities and interest that might have emerged. In this framework, assessment is used as a means for learning, and may contribute towards a final assessment, the goals of which are shared by the classroom and known to the students. This is crucial in order to keep role-play as a genuine exercise, rather than a performance that students enact in order to get a mark. If assessment is conducted to simply check that students have memorised concepts, then the teacher's task is that of ensuring that what the students had said matches with an accredited version (Katz, 2001). In contrast, in a model of learning and teaching which values the learners, the process of assessment can become an opportunity for teacher and students to engage together in understanding the process of learning undertaken by the students.

As the data showed, role-play allowed students to interact in a variety of different ways. A first element is that during the role-play the centre of the learning process was shifted from the teacher to the students. From this new, de-centered position, the task for teachers and researchers was to understand what was going on in the classroom, perhaps picking up cues about the students, and being able to assess the value of the activity for students' learning. For example, during the analysis of the recording from the Court of Inquiry (Chapter 5), it emerged that listening to students' presentations may be a way to gain insights into students' understanding of some biological concepts (i.e. the ability to

integrate the idea of food chain within that of food web), as well as their positions on power, on science and their level of political understanding and reflective abilities. Similarly, the teacher can gain new information about children’s styles of thinking or expressing themselves, difficulties in group work, or misconceptions in science. This leads to an understanding of assessment as a mixed-method approach, with multiple formats and purposes. As a means of example, different kinds of assessment are shown below:

Figure 7-1 Mixed-mode approach to assessment in role-play activities

Focus of the assessment	Example of task	Purpose of assessment
Ways of thinking (e.g. linear/logical versus systemic)	Students’ presentations in character (e.g. during the debate, as shown in Chapter 5). Making a concept map of a biological topic. Representing connections within a food web.	Formative assessment of students’ reasoning and understanding of the complexity of natural systems.
Misconceptions	Students’ presentations in character. Making of a newspaper article at the end of the role-play activity to report on the simulation and the issue. Drawing the path of production and consumption of prawns (indicating the flows of energy and matter).	Formative assessment of students’ conceptual development.
Meaning-making	Students’ feelings of being in role and their perceptions of the controversy. Reflecting on aspects of the simulation (e.g. conflict) and map out relationships and concepts (i.e. to understand power relationships between actors and how the conversation can be revisited and changed).	Formative or summative assessment of students’ reflective abilities.

That being said, more research needs to be put into devising and evaluating a more articulated learning and teaching unit to progressively lead students to higher levels of cognitive, social and emotional competences, and to become increasingly aware of their learning. In this view, role-play can indeed become a tool in the hand of students and teachers who can decide when it may be appropriate to run a role-play to find out about a complex issue, to try out current understandings, or even to test the quality of social relationships in the classroom. A good coordination between colleagues as part of an action-research project could also be very effective in helping students deal with the complexity of the activity.

To sum up, students' performances in the role-play emerge as efforts to engage in nested circles of participation, from the small group to society at large. An understanding of the co-existence of all these different ways of dealing with complexity can become a powerful tool of self-awareness: if students become aware of their own epistemic development, they can become aware of how they are organising knowledge and develop cross-disciplinary tools into meta-cognitive tools. Through the discussion of the empirical findings and subsequent reflection, I hope this work cast light on some of the tensions, identified in the literature around the concept of role-playing. Doubts were raised about the concept of performance, perceived by some authors as something artificial. In the realm of sociology, the metaphor of the stage was criticised as being insufficient to represent the unpredictability and variability of human life. In the realm of educational research, the concept of performance raised ethical and epistemological concerns (Cohen and Manion, 1980). The analysis and discussion of the findings showed a situation of construction of knowledge in the classroom. Students' learning was stimulated from both the levels of technical/consolidated notions (i.e. the specific science concepts), and experiential knowledge, linked to practice and context. The opportunity to perform during the role-play was thus an effective means for eliciting students' own experiences, rather than providing artificial answers. By such means, students were able to retrieve previous knowledge and revisit their learning, their ways of organising concepts and their making of meaningful connections, in dynamic forms. From an ethical point of view, this implied providing the conditions for self-expression. This position was then further supported by an epistemological shift. The investigation was not driven by the desire to know if students were telling the truth, or whether they were saying the right things. In the role-play, the process of comparing and juxtaposing different points of view, which may not be in agreement, highlighted the complexity of natural systems and the variety of human interpretations. In this way, the activity functioned as a strategy to convey an idea of science that is "falsifiable," and in the process of changing and "becoming."

To learn to express one's own ideas effectively, to learn to listen to the ideas of others and to develop an attitude of respect and willingness to integrate and enrich one's point of view together with others, is an important exercise of citizenship, and the beginning of an ethical maturation. This opens the scenario of science learning to include experiences from outside the school and the opportunity to nurture the development of students' identity. Experiences of relationship in the classroom context are put in dynamic interaction with other experiences that students may have in other contexts.

These opportunities may lead this discussion towards the opening of a new vision for science education in the current era.

The main line of argument unfolding from this discussion is that role-play can be a means for recomposing different dimensions of students' learning into a holistic experience, and this has the power to increase students' level of awareness of socio-ecological complexity. It was emphasised that this may be at the heart of a new reformulation of education, and this can perhaps include an expanded view on science, which might be better in tune with ethical and social activities of learning.

In the role-play, students are given the role of inquirers, as somebody who holds agency, cognition, senses and feelings, and it is in constant interaction with other inquirers and the context. Several authors have advocated the need to redefine the identity of the inquirer in research: feminist literature pointed out the need for including female voices and feminine approaches in research and inquiry. Other authors have expanded this concept to include the voice of native communities as holding relevant and legitimate knowledge of a place (Ingold, 2000; Berkes, 1999). Through the methodology of role-play students can perhaps begin to approach another kind of inquiry such as that which recognises the knowledge, experience, values and feelings of the inquirer as legitimate channels for understanding (Wallace, 2000; Harding, 2006; Primavera, 2005). In order to continue on the path of teaching socio-environmental issues we need to have an understanding of scientific inquiry and construction of knowledge as a complex interplay between what is known and what is unknown. New knowledge is produced out of this interaction, which includes the observer (the inquirer) in his/her socio-cultural context.

Holistic Inquiry

With this understanding, an interesting avenue of exploration of science education in schools is that of holistic science as conceptualised by Harding (2006). Drawing on Jungian psychology, Harding defines the notion of inquiry as an interconnected process of thinking, feelings, sensing and intuition. In relation to the use of these faculties in inquiry, he argues that much of current science has suffered from excessive emphasis on thinking, at the expenses of feelings, which has an ethical dimension. Hence the traditional scientific inquiry as we know it in the West has been characterised by a

language that reifies and objectifies Nature, and this has been contrasted to animistic approaches found in native cultures. In the context of the role-play, the non-violent dialogue and the search for understanding was very much in tune with an approach that values the other as a subject. The connection of thinking with feeling was important in bringing together facts and values in an integrated form of knowing and inquiring. As Jung had pointed out, the four dimensions of knowing are interrelated but we are more aware of some and less of others. Through interacting with others, and by being in Nature, we can develop a sense of perceptive awareness of the Planet and ourselves as *sensitive* beings.

In the context of research reported here, this points to the need to develop greater awareness of our ways of thinking and feeling, which in this role-play was possible only in part. Perhaps a cycle of activities could be added to the role-play to include other kinds of holistic experiences, which give students the opportunity to develop a sense of emotional participation. Equally important is an awareness of the feelings of anger and frustration, which prevent participation. This, of course, is moving beyond role-play to include other aspects of classroom learning. The idea of giving students the role of inquirers, choosing tasks and assessment strategies accordingly, is in line with a vision of making school experiences more meaningful for students.

In addition to in-class coursework, the paradigm of holistic inquiry makes a strong case for activities in the environment, which are not necessarily disjointed from science education. The theoretical insights offered by this different approach to inquiry can be helpful to understand the features of an educational approach which values complexity, and role-play can be a strategy within this approach. The complexity of the natural world can be accessed through the complexity of the internal world. This research can thus make an interim contribution, in beginning to create conditions in the classroom for bringing together thinking and feeling. As was indicated in the analysis, experiences of empathetic dialogue were not only analysed on the basis of what students had said, but also by giving relevance to the unsaid and to the pauses and silences which punctuated the discussion. This was interpreted as the creative silence of engagement with the other and listening, which can also be part of science education, and integrated as a tool for understanding complexity.

Hence, the results of this research can support further inquiry into assessment strategies and continuous professional development courses for teachers. A specific focus for research, for example, would be the assessment of creative processes, such as those involved in the interpretation of the role and the uses of language. Additional opportunities for inquiry, such as experiences of contemplation and immersion in Nature can then be introduced for supporting the development of students' abilities of visual imagery and sensual awareness.

7.3.5 Teaching and research

Both the cognitive aspects of students' learning and the ethical dimension of openness to the other, that were explored in the course of the role-play, can contribute to preparing students to deal with a reality that is filled with difference and it is not consensual. It is a constant exchange of meanings and actions, verbal and physical, with the people and environments around us. For this message to become lived experience in the classroom, further reflection on the changes affecting the role of the teacher is required. The literature on role-play had envisaged a change of role for the teacher, from the centre of the learning process to the periphery, but little was said about the symbolic meaning of taking a peripheral role. The review of the literature, spanning two decades of simulations and gaming (reported in Chapter 2), talked about role-play as a popular strategy, which worked in practice. Gaining from inputs from many disciplines, sociology, philosophy, psychology, and education, my work also attempted to link classroom practice to a reflection on values, pedagogy and epistemological positions. In the course of the discussion I tried to make role-play less insular, by talking about other approaches, which can be used as part of a learning unit. The important contribution was that of providing a conceptual framework of theory and data that could be offered to teachers to plan activities that are philosophically consistent and stem directly from their own observations of students' learning. In this sense, the teacher makes a clear choice of posing herself/himself as a host of students' learning and the whole class can become a place for inquiry. With regards to the large body of research that looked at the influence of teachers' beliefs on students' learning (e.g. Hewson and Thorley, 1989), the vision outlined here is not that of the teacher "sitting on the fence" as regard to social-environmental issues and education, but making a clear choice, delivering a clear message to the students. Listening to students' voices and being committed to continuously learn from this engagement is a message of openness, which makes it

explicit that everything can be questioned and discussed in the classroom – the role of the teacher, that of peers and even the possibility of playing new roles in learning. Other activities can also be introduced which are based on the same ideas of dialogue between perspectives and socio-construction, whereby students are invited to explore contradictions and alternative ideas. This could be a form of planned progression, stemming from the specific classroom context, dynamically interacting with curriculum, assessment and continuous professional development and underpinned by an idea of socio-cultural transformation that starts from the classroom.

The study of a methodology as developed here, has also opened some new avenues for research. This work benefited greatly from the help of the teachers; however, far from taking on the role of mentors, they had been, at some point, excluded from the activity. The change of role envisaged in this work was not easy, and as it emerged from the analysis of both the pilot and the main study, it required a number of other changes. What is needed is to reflect on what counts as relevant science learning, what counts as a good source of knowledge - that of the textbook, or that of a villager for example - to the development of a sensitivity towards the voices and the learning of the students. An interesting piece of evidence can be found in a recently published article by Levinson (2006) about teachers' perceptions of evidence. In the course of an interview, a teacher of social subjects, holding a sociology degree, admitted the difficulty of dealing with socio-environmental issues in the classroom because of a sense of uneasiness in deciding what may be valuable knowledge for students to be exposed to: *"shouldn't listen to what's in the media unless written by experts"*. In some way the teacher made a clear distinction between what in his/her mind was appropriate knowledge and felt that he/she should have control over the students' learning. In a similar way in the course of this research I had found myself in a situation of learning a different way of relating to the students. For example during the pilot study I remembered finding myself in agreement with the feelings of frustration expressed by the teacher – and in that occasion – I could have missed out on the contribution that the pupils were able to make, if the senior researcher had not been there to raise my awareness (section 3.4.11, page 93). These are examples which illustrate some of the difficulties in introducing current issues in the classroom. Such exercises impinge upon a shift in epistemology, stemming from the acknowledgement that in current research fields such as sociology and media studies, much of the relevant knowledge lies in the voices of the people, and

giving students the opportunity and the means to develop as inquirers of their social world.

Admittedly, working on all these aspects in the limited space of this research has necessarily implied falling back into a separation of functions, such as teaching and research. While in the course of the role-play the two dimensions were held together, at the end of the study, such connection was lost. Future actions could involve the creation of research and development projects with built-in possibilities for dialogue and joint working between teachers and researchers, to develop new professional roles. For example, the opportunity to collaborate together over a sustained period of time on constructing and delivering the role-play in the classroom may contribute to shared reflections and evaluations about the learning of the students. As part of a long-term vision, further trials of the role-play on prawn farming can be conducted in different contexts and be globally evaluated, to refine understanding of this methodology. In view of continuing this research, modifications can be introduced in the role-play to see how far students can be supported in their ability to deal with conflict. In more detail, future implementations of the activity can be structured as follows:

- Learning and teaching units could be designed to include an introduction on the nature of socio-environmental issues and the changing nature of science, raising awareness of the legitimacy of different voices and points of view.
- A role-play simulation can follow in different classrooms with students of different ages and abilities. It is important that students can work in circles of friendship, but also classroom contexts that make good use of cooperative activities can be suitable contexts for validating some aspects of the simulation.
- Additional support could also be given to students in the interpretation of their characters, perhaps by integrating the role-play activity into a drama and media studies lesson, which can provide students with further understanding of the simulated context. More generally, preparing students for conducting dialogue in role can involve the development of non-violent communication skills and emotional tuning, which can support an activity of discussion in situations of conflict.

- Involving students in the design of a role-play on a real issue could be a means for students to engage with complex situations, testing, revising and validating their own beliefs. This can increase their sensitivity to change and to some patterns of socio-technological development, as well as stimulating them towards finding satisfactory ways of being with others, in the classroom and outside.

From a research perspective, data gathering during the activity can also be adjusted accordingly. For example the questionnaires could include a section for the description of students' feelings. An evaluation of the role-play could also be useful, and this would need to include the voices of both teachers and students, before and after the simulation, as well as a sharing of the interpretation of the findings with them.

- Additional assessment activities could also be introduced at the end of the simulation or a cycle of activities (as suggested in Figure 7-1).

Finally, another important and interesting research area relates to teacher education and the opportunity to work in partnerships with researchers and experienced teachers in planning courses that can increase awareness of complex and controversial problems and provide them with the conceptual, methodological and relational tools for proposing such problems in the classroom. Hopefully, the analysis and reflection offered here can combine the interest and participation that typically accompany simulations (Cherryholmes, 1966), with consideration of the structures of the classroom, and the philosophy of learning that is being transferred to the students.

7.4 Closing remarks

In conclusion, this research has tried to address the question of raising critical understanding and participation in debates about socio-environmental issues and moved onto a consideration of the role of role-playing strategies in this context. The analysis of students' learning during the activity contributed to build a picture of role-play as a 'complex' activity, which engaged students at different levels. Although the purpose of this study was not to compare role-playing with other teaching methods that are used to learn concepts and topics, the learning which occurred during the role-play was put "in conversation" with other conventional contexts for learning.

A first level of learning concerned the assimilation and retrieval of information, as well as something about the process of scientific inquiry. Still, such learning could be controlled to only a very limited degree by an outside person. Students learnt what was meaningful to them, and their learning was fit to purpose, not disjointed from a purposeful task. For example, the learning of peaceful attitudes was not disjointed from the study of sustainable activities and the learning of notions. This led to a reflection on another aim for using role-play in science education. This is considering science education as a context for understanding current problems, which surround students in everyday life, and for practicing civic competences. In addition, science education was presented here as a means for socio-political preparation, and as an integral component in the education of the child. In this context, role-play can be used as a strategy for achieving different levels of aims and perhaps be used accordingly with other strategies to pursue a vision for science education which is that of promoting the development of personal strengths in relation to others, and to the context, to achieve harmony within and outside oneself.

Within this broader aim, the dimension of the research can acquire new features. As shown in the course of this chapter, data were gathered in the course of the activity with the main purpose of understanding the processes and structures of the role-play, with the intention of validating and (possibly) modifying them. However, as my sensitivity towards the data increased, new possibilities for research were disclosed. Data could be analysed to assess the development of competences, as well as students' understanding of the issue through the analysis of specific learning paths. In addition, a dimension of self-reflection on the side of the researcher occurred. The interpretations of the researchers, the subjective experiences of the students and the context of the inquiry blended together, as roles and experiences became blurred. Teaching and research in this case are combined and blended in a form of collective and reflexive inquiry (Ball, 1993).

The imaginative concept of "pedagogies of dislocation," forged by Edwards and Usher (2000, p.135) in contrast with the more traditional "pedagogies of enclosure," can powerfully capture the learning process which connected the classroom with different local places in a global context. In a time where schools remain very local institutions, and teachers are regulated nationally, governments and society are increasingly interconnected and global. The challenge science educators face is thus to prepare

students for complexity, uncertainty, equivocality and value conflicts. It is in this space that cross-curricular and reflective activities of inquiry can be located. Starting with a classroom that can work collaboratively - and critically - can open opportunities for departmental projects, involving other teachers and professionals. This can provide space for students to construct their own role-plays on issues that are important to them and may be inclined to be stimulated by new, less familiar issues or by new developments in the same issue.

By so doing, a step is made towards opening the learning space to a critical perspective to content, and what is discussed in schools, as well as to critical methodology. The scope of inquiry expands to include aspects of self and the world, in addition to disciplinary knowledge and research. In terms of curriculum delivery, the analysis of role-play provided a series of spin-offs for research opportunities of a cross-disciplinary nature. The complexity of the natural systems which is mainly dealt with through the empirical sciences (physics, chemistry, biology) was put in relation with the complexity of the internal world, which is cognitive as well as emotional, spiritual and psychological. But these outcomes lurk in the future. A more immediate outcome is the development of critical beings, with an education that sensitises them to healthy human relationships, which can be established in the classroom.

This research tried to show a different approach to understanding learning, based on an explicit ethical dimension. By such means it questioned underlying assumptions about categories of knowledge and how scientific knowledge is constructed, as well as how we value pupils as learners. The research started from examining the social and ecological interactions that characterised the issue of prawn farming, and it moved onto focussing more closely on the micro-interactions between students. Perhaps it is only by beginning from non-violence that it is possible to identify research paths that would enable us to link several realms, the emotional and the cognitive, the inside and the outside of the schools, in a way that is valuable and significant for education.

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1. Letter of consent - Main Study

Centre for Science Education
The Open University, Walton Hall, Milton Keynes – MK76AA

June 1, 2003

Dear Student,

On the dates of 18th and 19th June your class will take part in a role-play activity, during which you will be discussing an environmental controversy. The activity is part of a research project, developed at the Open University, which deals with education for citizenship and sustainability.

It has been agreed with your biology teacher Mr. xxxxx that the activity will take place during two biology lessons – on June 18th and June 19th.

For research purposes I will need to keep a record of the lessons using video-camera and tape-recorders. As part of the University Code of Practice I need to ask for your consent and that of your parents. The researcher alone makes exclusive use of the recorded material. All data will be anonymous and confidential. If you agree to take part into the activity please will you and a parent sign in the spaces below.

Thank you,
Laura Colucci-Gray

Signature of the student

.....

Signature of the parent/guardian

.....

2. Outline of the activity with the students

This material was given to the teacher prior to the activity, for information and organisational purposes.

THE TOPIC

The role-play is set in Southern India, in the State of Tamil Nadu. In this area, a conflict between the local communities and the companies of intensive prawn farming has been taking place for several years.

The conflict is rooted in a 1995 report entitled “The State of world Fisheries and Aquaculture”, where the Food and Agriculture Organisation of the United Nations (FAO) called for an increase in aquaculture to help meet the needs for a growing world population. A set of actions called “The Blue Revolution” was then promoted by International Organisations (FAO, WB, IMF) and sustained by Asian Governments. It was aimed at improving input of proteins into the diet, offering new opportunities for employment, and raising the economies of developing countries. Making use of government subsidies and customs concessions, local entrepreneurs and trans-national companies bought broad stretches of coastal lands, which were converted from mangrove forests and rice cultivation to ponds of brackish water for intensive prawn farming. In few years this activity has spread throughout the coasts of Asia, Central America and many other warm-water countries and it has increased enormously, recording a high level of production of prawns exported to European and American markets. However this massive development and intensive rate of resources utilisation have caused widespread damage to the coastal ecosystems and has threatened the subsistence economy of local populations.

In the Federal State of Tamil Nadu in Southern India local villagers – led by the Gandhian activist Jeganatthan - started a non-violent protest against shrimp farmers. Fishermen, agricultural labourers, sugar-cane growers, palmyra-climbers were brought together to constitute a large movement. In 1996 Jeganatthan brought the case of prawn companies in front of the Supreme Court of India which on December 11, 1997 ruled that all aquacultural prawn farms established within 500 meters of the Indian coastline be demolished by March 31, 1997. However in the following years the approval of the “Aquaculture Bill” by the Indian Parliament re-opened the conflict: prawn farms are still open, while the affected people are still protesting.

GAME RULES

The game is divided in two phases.

1st phase: court of inquiry

Students will be divided in groups of 3 members, and they will be given a role-card containing the characters' profile and points of view the students will have to take on about the controversy. Each group is given one role-card that the students will have to share, so that 1 group = 1 character.

A further group of 4 members is also formed. This is the group of the adjudicators, who are in charge to express a verdict after they listened to the different points of view.

Students of this group receive a card of their own plus a table where they can take notes about the groups' presentations.

Adjudicators = 4 characters.

In order to better represent their role, the groups will be given fact-sheets containing information on economical and social aspects of the Indian society, descriptions of the environment of the mangrove shrub and of the physiology of the shrimp, technical aspects of shrimp farming and a brief historical account of the development of the controversy.

Slides and photograph about the Indian Scenario will be shown at the beginning of the session and left available.

This phase terminates with groups' presentations in front of the adjudicators.

2nd phase: conflict transformation

At the beginning of the 2nd lesson the adjudicators express their verdict regarding the controversy. The adjudication will be in favour of some groups whilst other groups may feel angry. The 2nd phase is then aimed at exploring other scenarios in the future where the conflict can be overcome.

Students, still keeping their roles are regrouped in bigger groups of 7 members, each containing 2 characters holding contrasting opinions plus 1 adjudicator. (1 big group of 7 members = 2 characters + 1 adjudicator = 3 characters). Students of these new groups are asked to work cooperatively in a workshop of conflict transformation, in which the groups are engaged in thinking about the scenario they all would want in a future of 30 years time. The game will then terminate with presentations by the different groups.

SCHEDULE

The whole activity is planned to last for 2 hours.

1st Part: *Taking on a different perspective and experience intrapersonal and interpersonal conflicts: 1 h.*

- 5' Introduction to the activity: what is a role-play? (*teacher- Sheets n.1 & n.2*)
- 5' Description of the controversy (*teacher - Sheet n.3*)
- 5'/10' Presentation of the Indian Scenario - Slides (*Laura*)
- 5' Division in groups and distribution of role-cards (*in friendship groups?*)
- 15' Work in groups (distribution of fact-sheets and discussion) Tape-recorders
- 15' Simulation of the High Court (*the teacher in the role of an observer*) Video-Camera

2nd Part: *Dealing with conflict creatively: 1h.*

- 5' Adjudication (*no compromise*) - Video Camera
- 5' individual activity: *how did I feel about the adjudication? (free writing)*
- 10' (Joan) plenary session: *looking at the future in conflict transformation.*
Introduction with words of encouragement and declaration of the aims of the activity. Examples of successful conflict resolution in Northern Ireland, Colombia. Examples of the relevance of conflict resolution also within families.
Projection of 2 overheads to illustrate the various approaches for handling a situation of conflict:

slide 1: it shows how the two positions are diametrically opposed and how there can be a way forward, in the middle.

Slide 2: it shows a variety of attitudes that can be taken in situation of conflict. In this case we suggest looking along the arrow for attitudes which promote collaboration and creative solutions.

2' (teacher): people who were previously in different groups are now mixed together a bigger group of 7 people, made of three people in favour, three people against and one adjudicator, is formed.

15' *Brainstorming in groups* (Students in role): visioning the future. What I would like the future to be like in 30 years. **Tape recorders.**

Students are given a copy of the two slides as a reminder of the process they have to follow. The group discussion needs to be organised in a way that allows each student to express his/her opinion about the "preferred" future scenario. It should be emphasised that the "preferred" future is related to their personal fundamental needs. Somebody in the group takes note of what is been said. It is important at this point to stimulate the greatest variety of possibilities and suggestions. Some of them may not seem relevant in the current scenario but they can evolve and become more prominent as the time passes. They can start from a position of compromise.

15' Groups' presentations **Video camera**

5' individual feed-backs (*written activity*).

Feed-backs 3 weeks later (or at the beginning of the next term):

"I have been thinking of the role-play" YES NO

Now what I think is....

From this experience I think I learnt to... I learnt that....

3. Scenario overheads

This material is constituted by overheads used by the teacher to introduce the role-play. It is reported here in the original format.

3.1 Sheet 1: Description of the role-play



What is a role-play?

Starting point:

There is a real problem for which people are still looking for a solution. The problem is controversial because different groups of people have conflicting ideas on how to solve it.

- *Students take on roles:*

In a role-play, participants take up roles which give them a particular perspective on the problem. Those roles make the participants become "characters" that will have different opinions and points of view about the problem.

- *A decision has to be taken:*

The different views are presented and discussed before a commission of adjudicators. After having listened to each contribution, the adjudicators will express a verdict.

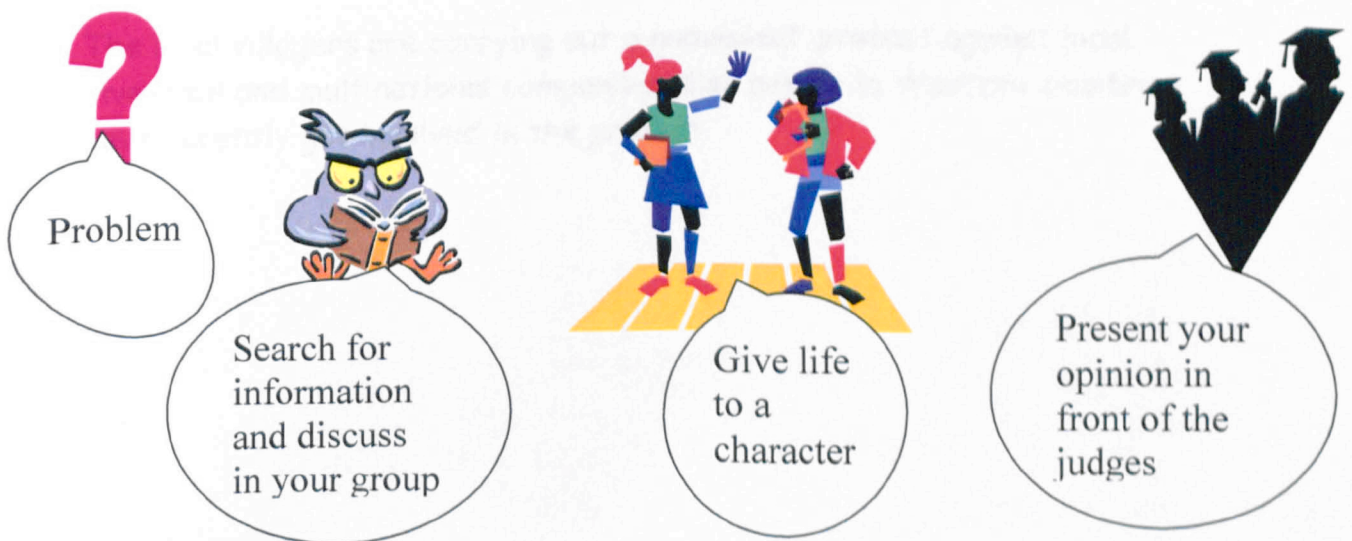


3.2 Sheet 2: Instructions



What you are asked to do:

- You are given a role-card, which describes the character you have to represent (his/her age, profession, background and point of view about the issue).
- You will be divided in small groups of 3 members that share the same role-card;
- Each small group is given four information sheets, which deal with various aspects of the problem.
- In your group you will read and discuss the problem as your character can see it. Then you will agree on what to say in front of the audience and who is going to be the speaker (but remember that also other members of the group can speak and give support!).



3.3 Sheet 3: The controversy



The controversy on intensive production of Prawns in aquaculture ponds

80's - 90's: this activity spread massively along the coasts of many tropical countries.

It was promoted and funded by International Organisations in order to:

- *improve proteins input into the diet*
- *offer new opportunities for employment*
- *raise the economy of developing countries.....*

1995 - 2002

this activity has also produced *widespread damage to the coastal ecosystems,*
and has weakened the subsistence economy of the local populations...

In INDIA:

The local villagers are carrying out a **nonviolent protest** against local investors and multinational companies. Also people in Western countries have recently got involved in the protest.

4. Adjudicators' sheets

This material was given to the adjudicators to guide them in the organisation of the Court of Inquiry (Sheet 1), and as a note-taking support tool that they could use during the presentations (Sheet 2).

4.1 Sheet 1: Instructions for the adjudicators

- You are the group in charge of making a decision
- At the beginning of the activity, you will decide the order in which the groups will make their presentations and you will make sure they will keep within the allocated time (2' for each group!).
- You will listen to the presentations and you will carefully analyse both sides of the argument. If you think you need better clarifications from the groups, you can then ask questions.
- You can take notes on the sheets provided which will be precious for you, when it comes to make your decision!

4.2 Sheet 2: Note –taking tool

ADJUDICATION

	Gives examples and clarifications	Explains the benefits	Explains the possible risks and uncertainties	Uses clear and appropriate language
Sonja Prawns can be easily produced in India and they are a suitable product for trading.				
Shailesh Landowner. He invested in prawn farming and he now provides jobs for the local villagers.				
Paul Power Industry brings knowledge and skills. Technology can offer solutions for our problems				
Dr. Krishna Prawns can be an important food resource.				

<p>Tami She asks for land being given to the poor people. They will grow their own food and they will be autonomous</p>				
<p>Margherita Lots of species seem to have become extinct due to the reduction of mangroves. Catches from fishing have therefore decreased.</p>				
<p>Jeganatthan He asks for land to be given to the poor people. He wants a small-scale economics, based on autonomous villages.</p>				
<p>Dharvar Industrial development has brought also unemployment and alcoholism. Poor condition of land and water is making the situation worst.</p>				

DECISION:

5. Reading materials

The reading materials included information about the ecology of coastal areas, social aspects of Indian society, technical information about prawn farming and a sample of the controversy reported in the news.

5.1 Ecological aspects: Mangroves

MANGROVES... A "GREEN GARLAND" AROUND INDIA

The coast close to the river deltas are low, sandy and in the tropical zones the vegetation is made up of plants typically called *mangroves*. These plants are very special. They have a system of roots, which grows under the water and which keeps the trees anchored to the sand, mud and sediment. Those roots are sturdy and flexible and they finish by weaving a net, which keeps the sand in place and guarantees stability for the trees.

A nursery for the animals

Due to their location between the land and the sea, the mangroves play an important role, as they:
protect the coast from erosion by the tides;
protect the fields from flooding and cyclones.

They also offer tranquil niches of sheltered environment, ideal for a wide variety of animals (birds, fish, insects, and crustaceans...) where they can find food, lay eggs, and take refuge from predators.

The mangrove forests also play an important role for the human population. For example they provide wood, and the local people know how to extract healing oils and antiseptics from leaves and bark. The mangrove trees also protect the rice fields from tides of salt water.

Distribution of mangroves

Because of the increasing use of soils for agriculture, and in the latest years for the spread of intensive prawn farming, the surface covered in mangroves is reducing world-wide, as one can see in the table below.

Year	Extent (Kmq)
1901	12.627
1989	4.255
1990	1.894

5.2 Socio-ecological categories in India

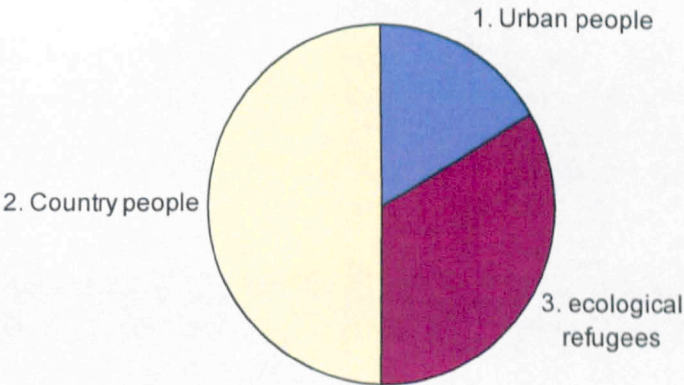
SOCIAL CONDITIONS IN INDIAN SOCIETY

India is rich in natural resources. A variety of crops can be cultivated. The most important ones are: rice, cotton, wheat, tea, chick-peas, and a wide range of spices. Important traditional industries are the manufacture of carpets and metal-working (especially gold, silver and copper). However in spite of so much natural wealth, a large part of the Indian population live in conditions of poverty, and malnutrition. The Indian society consists of 3 main groups of people:

- 1. Urban people: they are the wealthy sixth of the population living in the wealthy parts of the cities - big land-owners, entrepreneurs and professionals (eg. lawyers, doctors)
- 2. Country people: they make up for half the population. They are the inhabitants of rural villages: farmers, fishermen, fruit gatherers (see picture on the right) and others who depend on the local environment for their food and occupation.
- 3. Ecological refugees: they now form a third of the population and live on the margins of big cities. Many of them were landless workers who had to abandon their villages. They are very poor, most have no work and are lucky if they find work as servants to the rich families. The percentage of people living in these conditions is increasing.



3 categories of Indian people



5.3 Prawn farming in India

THE INDIAN PRAWN

India is an ideal location for the aquaculture of prawns: there is enough fresh water, the climate is right for various different species and there are large stretches of coastal land where both marine and fresh water are easily accessible. The possibility of getting at least two harvests a year makes it seem very profitable activity. The production of prawns is very high and it makes India a strong competitor on the market.

Disease in prawn farming

The large number of prawns in the ponds causes a rapid deterioration of the water quality and epidemics amongst the prawns.

The farms often have to be abandoned. When a pond falls into disuse the ground - impregnated with chemical substances and quantities of salt - can no longer be used for agricultural purposes.



Proposed solutions

Attempt to reduce the density of prawns and provide a more effective system for removing the waste.

Use new technology to ensure better oxygenation of the water and provide biological filtration system for waste.

Problems for agriculture: the salt in the soil

The inhabitants of the Indian coastal villages lament the progressive degradation of their agricultural land. Large stretches of ground are impregnated with salt and the same problem affects about a third of all irrigated land in the world.

This problem is mostly found when there is excessive extraction of water in densely populated areas, for household and industrial purposes. In coastal areas, when there is excessive extraction of fresh water by pumping from the underground, salt water may intrude in and so be found in the wells. Once salt comes to the surface the wells have to be abandoned.

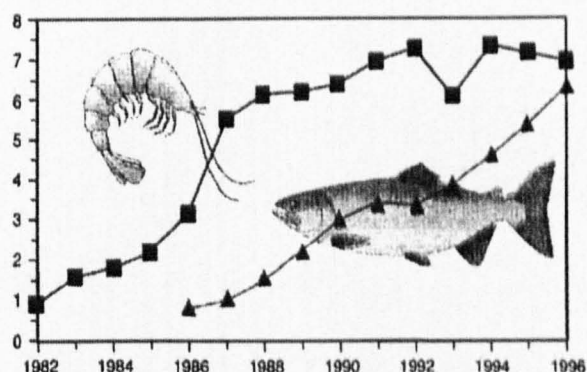
In some areas aquaculture plants make this problem worse by pumping out a lot of fresh-water to dilute the salt-water in the ponds where the prawns are grown.

5.4 Prawn farming in the news

THE NEWS

What happened after the order of prohibition issued at the Indian Supreme Court?

The world production of prawns and salmon has doubled in the last twelve years and is now more than a quarter of all the fish we eat. A few Indian farmers were already raising prawns in 1980 by using traditional techniques, but by 1990, with the introduction of technological devices, intensive farming had increased by a factor of seven causing also severe environmental damage.



- Here is a sample of the news coverage on the issue of prawn farming:

KOCHI, India. 14 December 1996 Indian journalists reported the decision to close aquaculture plants But Mr. Abraham Tharakan of 'Business Line' said that the industry had already invested around 2.000 Rupies and had found a way to control the pollution. Closing down the fish farms 'would be a tragedy for the economy' he said. (G.K. Nair, The Hindu, 14 December, 1996)

KOCHI, India. The demand for prawns in Japan has diminished, but this has been more than compensated for by an increased demand in the USA. (The Hindu, 22 July, 1998)

MUMBAI, India. Activists from Greenpeace joined the fishermen in Mumbai on The World Day of the Fish. They are demonstrating because fish numbers are declining and pollution has poisoned their breeding grounds. (The Times of India, 22 November, 1999).

- Letter written by S. Jeganathan to the Prime Minister in New Delhi, 23 July, 1999

Vinoba ashram, Kuthur, India.

"Honourable Minister,

Tragic events are occurring on the coasts of our country which have been invaded by multinational companies. The people have had to fight against them for more than ten years. Hundreds of men and women have been put in prison. A movement called Gram Swaraj presented an appeal to the Indian Supreme Court which ordered that all the aquaculture prawn plants should be closed by March 1997. But our officials do not respect the law. From July 9th, have I observed a period of fasting and prayer.

The purpose of this letter is to bring our problems to the attention of the Prime Ministers of Tamil Nadu and the other coastal states, so that the ruling of the Supreme Court may be carried out. In that way the coast will be saved from environmental pollution, and a stop will be put to the suffering of millions of our people.”

6. Role - cards

List of Characters

SONJIA REY
Minister for the Development of India

SHAILESH
Indian landowner

DR. KRISHNA
Doctor

PAUL POWER
American entrepreneur

TAMI SUNETHRA
Representing the land movement

MARGHERITA BROECARTS
Ecologist

JEGANATTHAN
Leader of the nonviolent movement

DHARWAR
Head villager

Adjudicators

ROBERT BROWN
Minister for Indian Agriculture

PRISCILLA SINGH
Representative from Food Organisations

Dr. GOSHIVAH
Doctor

MARCO DANDRI
Volunteer

Additional characters:

ANITA RANDRAPRADESH
Medical researcher

SATISH RAMPAL
Ministry for Indian Education

SONJA REY - Minister for the Development of India

You are a 60 years old woman and you have devoted your life to the development of India. For a long time you were a civil servant in the Indian Central Government and you wanted to improve the living conditions for the people. You strongly believe that it is important to establish successful trade with the developed countries, which will bring in foreign currency. You know about the climate in India. The coastal location is just right for prawn farming and in fact India has the second highest production of prawns in the whole world. You also know that people from rich Western countries are very keen on eating "Prawn cocktails" so there are good opportunities to export all what can be produced. As a plus, you know that other jobs can be created in industries which can manufacture prawn-feed for other Asian countries where prawn farms have developed.

You want therefore to encourage this kind of industry and you are confident that technology can tackle any problems that arise.

Why do you want to support prawn farms?

Why do you think this activity can be very successful?

Are there other things connected to prawn farms?

SHAILESH - Indian landowner

You are an energetic man, you are married and you have got with six young children. You are well educated. You went to London University to study Economics. When you came back to India you decided to develop prawn farming. You invested all your money in this project and the profit increased year by year until last year.

As your business grew, you bought more coastal land and you built the most modern kind of prawn farm complete with pumping machines to provide water circulation, and to add more fresh water and oxygen when needed. Before you bought the farm you made sure that there was ample fresh water available in the land which could be pumped up when needed.

In your farm about 30 people from the local village have found employment. You pay them sufficiently for a decent life-style and for many months of the year their salary is secure. You know that they and their families are well pleased. And also for you, prawn farms can guarantee security.

How do you feel about modern technologies?

What did you think when you heard that some people wanted to shut down your farms?

Why do you think the people who work in your farm are happy?

DR. KRISNA - Doctor

You are a retired doctor and you can still remember the bad times when there were awful famines in which as many as two million people died in a single year! Indeed it was an event of this sort, which encouraged you to become a doctor. You studied in the U.S.A. and when you look back, you remember that as one of the best times of your life.

You worked in South India and you remember that there was chronic malnutrition amongst children which was due to lack of protein. In the good years, soya beans and other protein - rich vegetables kept children alive, but when the rains failed children died. Those who farmed on the coast and could catch prawns or fish were better off but there was never enough to go round.

When you heard that new ways of farming prawns to increase the harvest were being developed, you welcomed it as very good news. Unfortunately, as you know from the statistics and medical reports, there are still some children dying, from poor quality of the water. This is why you think that prawn farming, because they can bring India to better development, has to be supported.

How would you persuade people that it is important to have more prawn farms?

Which kind of food Indian people are mostly in need of?

When you heard about water pollution along the coast, did you worry about the people living there?

PAUL POWER - American entrepreneur

You are a young American entrepreneur and you believe that the main point is to get all developing countries like India to industrialise. To all those people who are worrying about life conditions in India you would convincingly reply that the answer is: money! By keeping high levels of production, prawn farms can initiate and maintain a continuous trade with Western countries and that will bring high profit to India. You see prawn farming as one of the best hopes for this and you want to see the Indian Government supporting this enterprise, by favouring entrepreneurs in buying land and by introducing tax relief.

Of course you heard about some romantic schemes for redistributing lands to the poorer people in India, but you want to warn people against it. You don't believe in old-fashioned methods.

You see farming as being a technological enterprise these days, which requires knowledge, skills and investment. With the right use of the techniques and the scientific knowledge we have, we can't get it wrong! Some problems, like water pollution, require technological treatment - the addition of the right chemical, not political demonstrations!

What advice would you give to the people at the Indian Government to encourage development in India?

What do you think will happen to India without prawn farming?

What do you think about those schemes of redistributing lands to the poorer people in India?

TAMI SUNETRA - Representing the movement for the land

You are a 40 years old strong woman and you are a representative of the Southern region of Tamil Nadu. You are very sensitive to this issue because you saw the people in your region losing 10.000 hectares of coastal land when the Government sold it to industrial companies for prawn farming. Now you are worried because your village has been left without any land of their own.

You went on a big march for land, and you are part of a movement to keep up pressure on the local government. You want the Government to know that local people need land to work on, to grow food for their families.

But there is also another problem you are struggling to solve. The industrial companies are cutting down the mangrove trees, which used to grow round the coast, in order to run pipes from the sea to their big prawn ponds. When you saw it the first time your heart sank. You could not recognise the same place where you were brought up and you immediately knew that only bad could come from this lack of concern for Nature! In fact when a cyclone hit the region in 1993 there was no protection. You saw the pipes as well as the villagers' homes being destroyed, and the land was left full of salt. Now people can grow nothing.

How would you persuade the Government that the prawn farms are a very risky activity?

What did it happen after the cyclone hit the region in 1993?

How do you think can local people get some land of their own to cultivate?

MARGHERITA BROECARTS - Ecologist

You are a Dutch graduate student and you are employed at the centre for Ecology and Development. You are studying local problems. From your research you know that before prawn farming became big business, the farmers used to raise wild prawns by letting the tides fill up ponds at high tide and catch the wild prawns. Then they would let the water out at low tide by opening sluice gates. When you read about this, you recognised similarities with how you used, as a child, to catch prawns on the beach in Holland.

But now in intensive farms, they bring in specially bred young prawns that grow to a bigger size. Since they started this intensive farming, a considerable amount of fresh water is being pumped out from under the ground to dilute the salty water in the ponds down to the right level of salinity. You are worried that this massive use of the water by the farms will make the water scarcity in India even worse. Another problem is the mangrove trees, which have been cut down and many species of wild prawns and fish seem to have died out. You are not surprised. You know that the network of roots provides a nice and protected area for fish to release their eggs and reproduce. The villagers also think the tree's roots release some special nutrients for the fish. I am trying to find out how many species have become extinct.

Why is the disappearance of the variety of fish in the sea a problem?

Who is going to be affected by the chopping down of trees?

Why are the mangrove trees so important in that region?

DHARWAR - Head villager

You are a 50 years old man and you are the Head Villager here in the coast in Tamil Nadu. The people in your village come to you every day lamenting terrible environmental problems both on the coast and on the inner land. Most of them have no land and no employment. Others who used to live on the products they could gather from the forest, now can hardly find any food to go round. They are very depressed and when they do get money, some of them waste it on drink. Alcoholism now is a serious problem.

Many families are leaving to find a better life in the big cities. But you have seen how bad the living conditions are there. There is no housing, people make homes out of sheets of corrugated iron. There is no sanitation or clean water. You fear that many of the children will die there. Your only hope is that the prawn farms will be closed down, the land purified, and given back to the people.

Why so many families are leaving the villages?

Can local people find employment in the farms? How do you feel about that?

Do you think the living conditions of the local people would be better in the cities?

ROBERT BROWN - Minister for Agriculture

I was invited to be one of the decision-makers because of my position in the Indian government. I am of English origin and I was educated at London University in Agricultural science. I have both Indian and Western perspective on the problems of prawn farming. Of course I have followed these developments closely, both the economic aspects and the health problems.

Are you concerned by the problem of salt in the soil? How are going to find out whether it is a real problem and how it could be solved?

What do you think about the schemes of redistribution of the land as it was advocated by Gandhi? Do you want to find out more?

PRISCILLA SINGH - Representative of a food organisation

I represent the International Food and Agriculture Organisation for whom I have worked for the last ten years. I am a graduate in Food Science and have been involved in food crises in Africa. In the present Indian problem I am especially interested in food distribution across the whole population.

What does Indian people's diet in the villagers actually consist of?

What in your opinion could improve the diet?

Dr. GOSHIVAH

I was asked by the local government of Tamil Nadu to participate in this decision-making meeting. For many years I have been concerned with local health problems such as water shortages, and epidemics of disease. I am anxious to know if prawn farming will improve health in the region.

What are the important health factors you are looking for in order to make up your mind about prawn farming?

Why do you think that alcoholism is becoming such a serious problem?

MARCO DANDRI - Volunteer

I am a volunteer with an Italian organisation which is working on soil problems in this locality. I graduated in Agricultural Science in Italy before I came out here. The problems in Tamil Nadu include desertification due to the salt penetrating the soil when the protective mangrove trees round the coast are cut down. I am here to hear from both sides how they think these problems can be solved.

Do you think that the local people could protect the soil from becoming salty?

What do you hope from the entrepreneurs who are promising that they can continue prawn farming in secure technological conditions?

ANITA RANDRAPRADESH - Medical researcher

I am here because my recent research involved studying the infectious diseases of prawns. They can be caused by viruses or bacteria. I know about some research projects carried out in Scotland and Canada that have been testing out new drugs that might increase the immunity of prawns to disease.

Do you think that treating the prawns would be a good solution for the whole situation? Whom will you ask to give you their own opinion about that?

SATISH RAMPAL - Ministry for Education

I am 50 years old and I have a degree in arts and literature. I have been working for the Indian Government for a long time and the problems with education never seem to be solved. I am here today to listen to the two groups and I am very interested to know what they suggest for the prosperity of my country.

Whom will you ask about the state of education in the country?

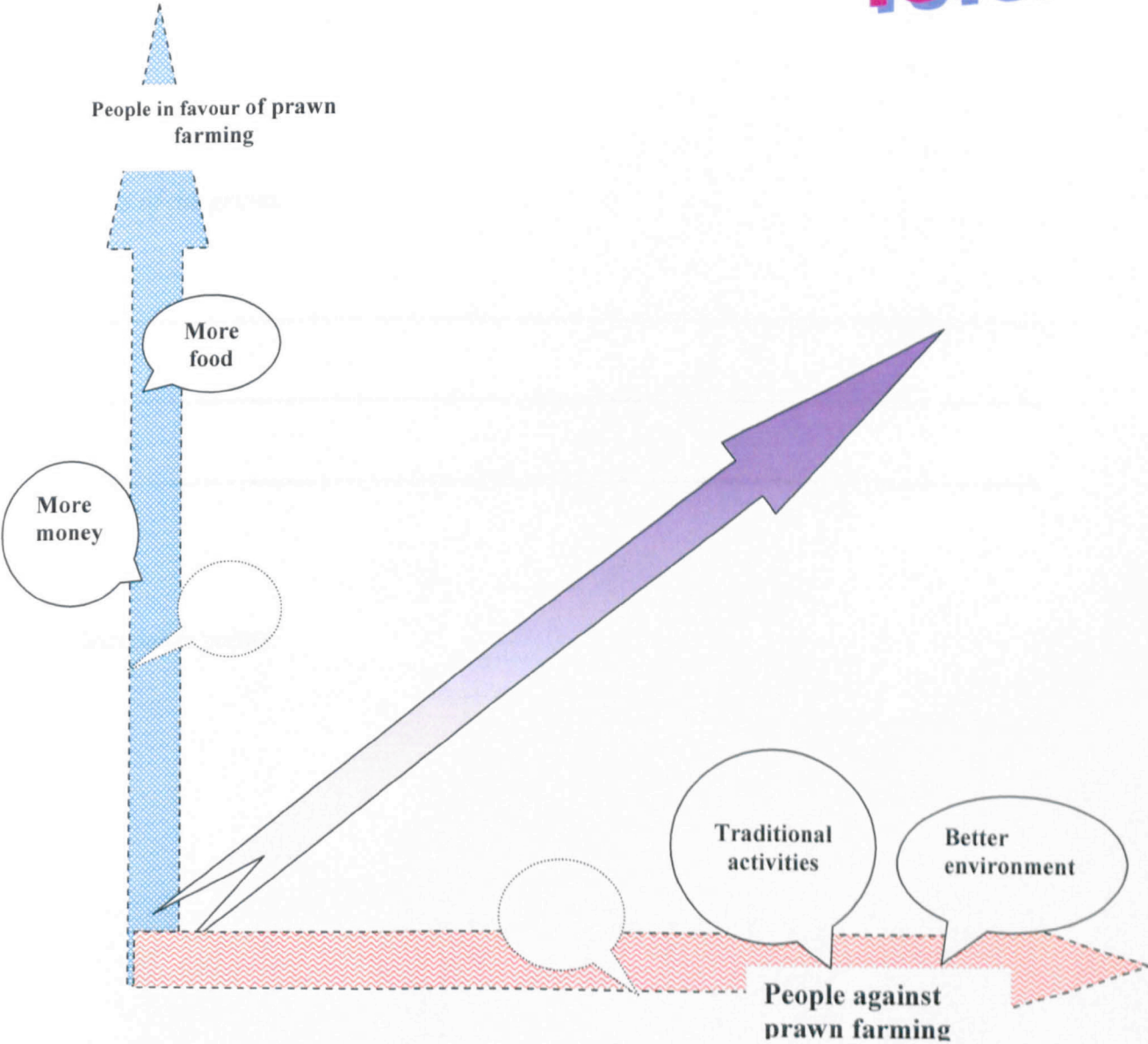
Do you think more industrial development will bring also better education?

7. Dealing with conflict

Material used by the senior researcher to begin the activity on dealing with conflict.

How can we achieve this goal together?

FUTURE



8. **Worksheet**

This sheet was given to the groups during the conflict resolution activity, to keep a record of the main discussion points.



The dialogue phase

Members of the group:

Our discussion points:

9. Questionnaire 1 – Pilot Study (School 1) and Main Study

Part A

How did I feel in my role?

.....

.....

.....

Part B

After the adjudication?

.....

.....

10. Questionnaire 1 – Pilot Study – School 2

Name.....

Role.....

Are you for or against prawn farming in India?

.....

.....

.....

Did you manage to feel your way into the role you were playing?

.....

.....

AFTER THE ADJUDICATION

How do you feel about the results? Please tick one box only

pleased ☐

Angry ☐

Excited ☐

Sorry ☐

** Something else (add it here)

.....

11. Questionnaire 2 – Pilot Study (School 1) and Main Study



A few lines for something that I want to say...

The adjudication made me feel

angry ☐ disappointed ☐ victorious ☐

other.....

Now, what I feel is:

- ☐ angry
- ☐ positive about the future
- ☐ willing to take action
- ☐ other.....

There is something that I wanted to say and it has not come up

.....
.....

I think that the best idea for conflict transformation activity was

.....
because
.....

12. Questionnaire 3 – Pilot Study and Main Study



Role-play: Prawns on the table

After thoughts

1. "Have I been thinking of the role-play?

YES ☐ NO ☐

2. What do I remember the most about it?

- What the controversy was about
- My role-card
- The verdict of the adjudicators
- The resolution of the conflict
- Other.....

3. From this experience I think

I learnt to... ..

.....

.....

I learnt that.....

.....

13. Slide presentation (CD-Rom)

1. Mangroves
2. Mangroves along the river in Ecuador
3. roots of the mangrove trees
4. Mangroves as a nursery for animals
5. variety of mangrove trees
6. socio-ecological role of the mangrove trees
7. pond construction and deforestation
8. pond for aquaculture
9. prawns and rice for export
10. prawns for export (Italian market)
11. farmed 'Jumbo Tiger' prawns
12. tiger prawns and Atlantic prawns on the market in Italy
13. villagers
14. Jeganatthan and Krishnammal
15. villagers' meetings
16. intensive prawn farming
17. pond building site
18. pond building site 2
19. pond for semi-intensive aquaculture
20. pond for semi-intensive aquaculture 2
21. fishing farmed prawns
22. abandoned site
23. salty soils
24. rice fields
25. farming activities in India
26. high -tech prawn farming
27. Jeganatthan's fasting temple
28. LAFTI
29. fishermen's village in Ecuador
30. traditional boats for local use
31. children in Ecuador
32. Nagappatinam fish market (India)
33. Fish market (India)
34. town market in India
35. Indian town